The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

AUGUST 1938

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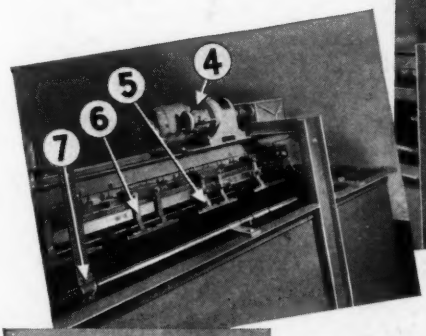

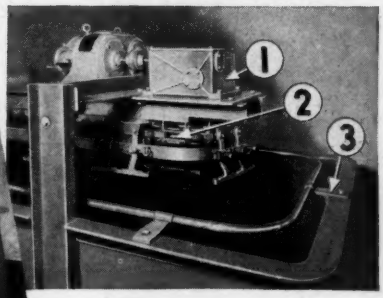

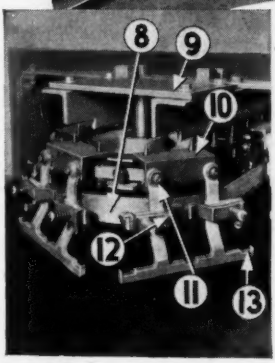

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The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

A Society for the Advancement of the Science of Electro-Plating

AUGUST 1938

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The 1938 Convention Proceedings

Since our good friend Past Supreme President H. A. Gilbertson of Chicago Branch suggested that we give the proceedings of future conventions to our members, free of charge, the idea has grown to such an extent that when the matter came up for discussion at the Milwaukee Convention it was unanimously adopted. At the same time it was voted to increase our Per Capita Tax ten per cent — 60 cents, per year per member to help in the expense of printing the increased number of copies so that every member in good standing could receive one.

After careful consideration of the many proposals sent us by reputable reporting and printing companies, we agreed with Mr. Gilbertson that the volumes could be printed for approximately $1.00 each. Unfortunately none of us could foresee the great volume of work that was to be accomplished both at the business and educational sessions in Milwaukee, all of which was reported, for the purpose of being published in the Proceedings. When all the details connected with the business and educational sessions were finally put in shape, we found that the total number of pages of the educational sessions amounted to 307, this with an additional 119 pages of business sessions would give us a book of 426 pages. Compared with a book averaging 272 pages in past years, we can readily see the amount of work reported this year over and above that of former years.

When all these items were presented to Past Supreme President A. B. Wilson who was appointed by President Phillips to edit this year's copy before printing, it was decided to ask the opinion

of the Executive Board regarding the advisability of omitting the business sessions from this year's proceedings. All voted in favor of this suggestion, because of the increased cost.

Our readers must pause here and realize that it was not our intention to distribute the proceedings to the members of the A.E.S. this year. We were not prepared financially or otherwise to make the attempt. However, the delegates at the convention voted to begin this year, and it looks as though we will survive although there have been many headaches in our initial attempt.

The 1938 copies of the proceedings nicely bound, with 100 lb Hammermill Crepe Finish Ebonite coverstock, printed on 20 lb Fraopaque paper so that the printing on one side will not show through on the other, will be shipped by freight from Milwaukee not later than August 22 to the Secretary of each Branch. The Supreme Society will pay all shipping charges. The local branch, however, will be responsible for the distribution. There will be a little extra work involved in getting these copies to all our members, but with a little patience and cooperation there should be very little trouble.

In future years we hope to be able to publish all sessions, business and educational in the proceedings. This year, however, for the reasons mentioned, the former will be printed in the REVIEW commencing with the August issue.

It is our earnest hope that our readers will appreciate their copies of the Proceedings when they receive them. We also hope that our membership may be increased considerably this year, and that a determined effort will be made by all our members to increase the advertising in the REVIEW.

We desire to be helpful to all our branches, especially the smaller ones, other than giving them the Proceedings. This can be accomplished by everyone concerned loyally supporting the various programs, now being prepared by the Supreme Officers and Chairmen of the Committees recently appointed by President Phillips. With the enthusiasm and cooperation of our members we hope to make this year the best in the history of the A.E.S.

Physical Properties *and* Uses *of* Heavy Nickel Deposits

by W. A. WESLEY

Research Chemist, The International Nickel Company, Inc.
Research Laboratory, Bayonne, N. J.

Read before a Joint Meeting of Hartford Branch A. E. S. and Hartford Chapter A. S. M., April 12, 1938

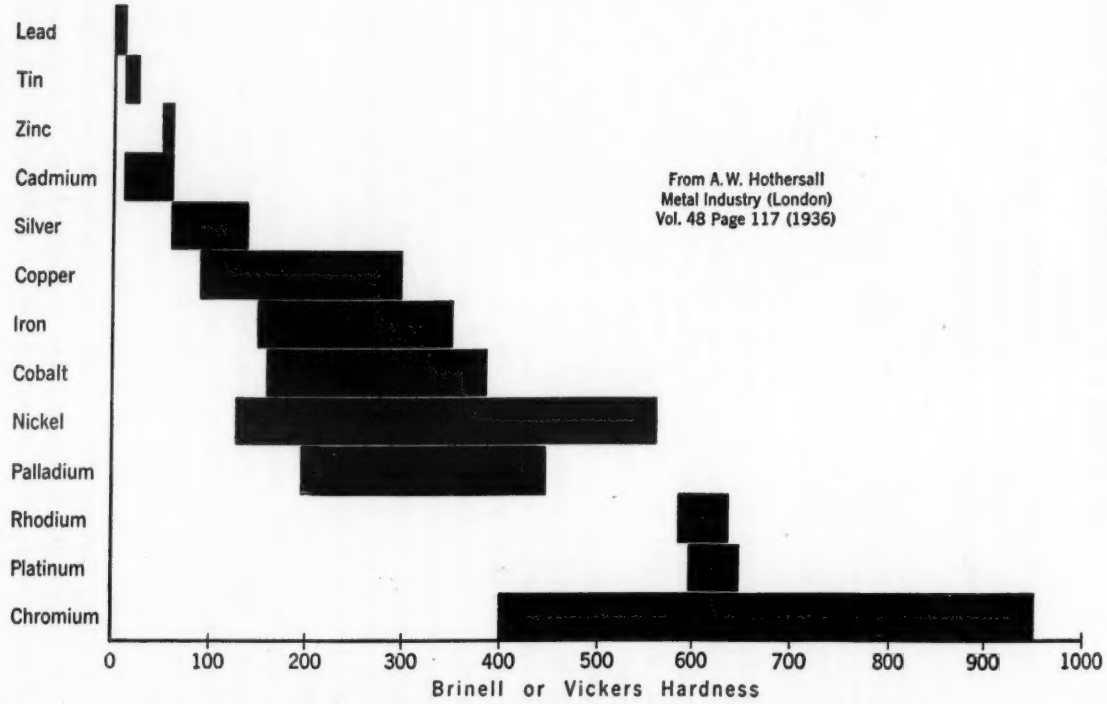
ABSTRACT

ELECTRODEPOSITION of heavy nickel layers is viewed as a cold casting process, capable of producing metallurgically sound nickel with excellent physical properties. The plating industry is already equipped to supply such a product for engineering uses and thus diversify and expand its business. The structures of soft and hard nickel deposits are illustrated and correlated with mechanical properties. Old and new engineering uses for thick nickel deposits are reviewed. They include salvaging of worn and mismachined parts, protecting parts against combined wear and corrosion, and the manufacture of thin sheet metal, perforated strip and the new electroformed screens.

ELECTRODEPOSITION is generally considered only as a means of imparting non-rusting, bright surface finishes to improve the appearance of manufactured articles when new and during their useful life. There are other fields of work for which the electroplater is already equipped and which await more aggressive exploitation. These involve engineering uses, such as salvaging worn and mismachined parts, protecting parts against combined wear and corrosion, and the direct electroforming of finished metal shapes and parts. One sometimes hears predictions that organic and other finishes will eventually displace plated coatings and put electroplaters out of business. Such predictions are exaggerated because the plating industry is continually improving the quality of its products. Its position can be further advanced by everything which tends to broaden its field of usefulness.

In considering the possibilities of electrodeposition for uses outside the appearance field, it is instructive and permissible to look upon it as a cold process for casting metals. Every plater's shop contains the equipment needed for casting metallurgically sound metal, with physical properties better than those of the same metal in the furnace cast form, often equal to those of the wrought form, and sometimes with one or more properties superior to those attainable in any other available form. Hardness, faithful conformance to the surface of the mold, electrical and thermal conductivities are examples of properties in which electrolytic castings can excel other forms of the same metal.

Metallurgically speaking, electrodeposition is a cold process



Ranges of Hardness of Electrodeposited Metals Reported to 1935

Fig. 1

and, although it has its peculiar defects which must be avoided, it does not introduce the ill effects of heating, such as "weld decay," cracking by thermal stresses, softening with consequent loss of strength, nor hardening with loss of ductility. Why is it that electrodeposits are not used to a greater extent as engineering materials but are confined chiefly to use as thin surface finishes? One reason is that not enough study has been made of the physical properties of deposited metals. Another is that what is already known about them is not taught in schools. Electrodeposition has interested chiefly the chemist, who knows little about the habits, structures and uses of metals, while the metallurgist, who knows all about these things, has rarely seen a piece of electrodeposited metal thick enough to stand up alone.

THICKNESS OF DEPOSITS

The principal point of difference between electrodeposits employed for "appearance uses" and those for engineering uses is in the thickness. For reliable protection of steel against the atmosphere of coast and city one-thousandth of an inch of nickel is employed. High grade bumper bars for automobiles are provided with double this amount to protect against rusting even after severe mechanical damage or wear. Pores detectable by the ordinary tests disappear at about 0.002 inch so that heavier deposits behave like solid nickel.

The engineering uses which will be discussed later, with few exceptions, require deposits of much greater thicknesses. 0.005 inch may be applied for resistance to corrosion and wear, while deposits of the order of 0.02 inch are used for reclaiming mismachined parts. "Cold castings" as thick as 0.2 inch have been applied in building up large worn shafts and in forming completely electrodeposited metal objects.

HARDNESS RANGES

One of the first things a metallurgist wants to know about a metal is its hardness because this classifies it and tells him something of the limits of its usefulness. Figure 1 shows the ranges of hardness which have been reported for thick deposits of metals, according to Hothersall[1]. The highest values shown for a given

[1] A. W. Hothersall: *Metal Ind.* (London) **48**, 115 (1936)

Ranges of Hardness of Electrodeposited Metals Reported to 1936

Fig. 1

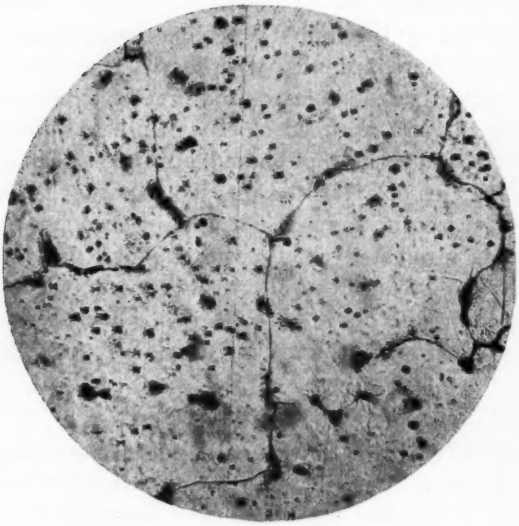


Fig. 2 Structure of Cast Nickel **X100**

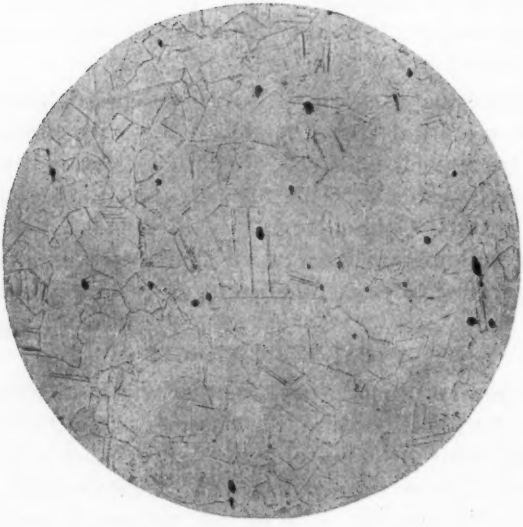


Fig. 3 Structure of Hot-Rolled Nickel **X100**

metal are not in most cases commercially attainable due to the fact that they are generally accompanied by excessive brittleness and internal stress which lead to spontaneous cracking. Nevertheless, it is evident that an enormous range of hardnesses can be obtained in electrodeposits.

For practical purposes the range can be covered quite well by equipping the plating shop with only 4 plating baths, three of which are already present in almost every plant. These are listed in Table 1, the hard nickel bath being the only one not in common use today.

TABLE I
Four Bath Electro-Forming Shop

		Vickers Hardness
(1)	Copper : Acid Bath	40-60
(2)	Soft Nickel : Watts Bath	130-150
(3)	Hard Nickel	350-450
(4)	Chromium	500-900

NICKEL PLATING CONDITIONS

Although Fescol, Ltd., the British firm which has specialized so successfully in "electrocasting", works its baths only at room temperatures and a relatively low rate of deposition, it is felt that the longer periods of time required to make heavy deposits would not be feasible in the United States.

SOFT NICKEL

The Watts type bath used for rapid deposition of thin deposits works equally well in building thick layers. At a temperature of 140°F. there is little difficulty in using a cathode current density of 50 amp. per sq. ft. without agitation of the bath or, for simple shapes, at 100 amp. per sq. ft. with agitation. Suitable plating conditions are shown in Table II. At 50 amp. per sq. ft. about 0.0024 inch of nickel is deposited per hour so that 0.020 inch on the diameter of a shaft requires about 4 1/2 hours plating time.

TABLE II
Soft Nickel Plating

Solution:	Nickel sulfate (crystals) 44 oz. per gal. Nickel chloride (crystals) 4 oz. per gal. Boric acid 4 oz. per gal.
Temperature:	140°F.
pH:	2.0 (Electrometric)
Current Density:	25-50 amp./sq. ft. (No agitation) 100 amp./sq. ft. (With agitation)
Hardness:	140-160 Vickers (10 Kg. load)
Rate:	0.0024 inch per hr. at 50 amp./sq. ft.

Fig. 4 Structure of Soft Nickel Deposit X500

Tensile Strength: 51,000 lb./sq. in.
Elongation in 2 inches: 28%
Hardness: 150 Vickers

Fig. 5 Structure of Moderately Hard Nickel X500

Tensile Strength: 98,900 lb./sq. in.
Elongation in 2 inches: 21%
Hardness: 230 Vickers

Hard Nickel

English investigators have led the way in the development of methods for depositing thick layers of relatively hard nickel. Macnaughtan and Hothersall[2] showed that the presence of ammonium sulfate in nickel plating solutions permits formation of sound nickel deposits of much higher hardness than could be produced in baths containing other addition agents. Very little work has been done on this problem in other countries.

Experimental work in the International Nickel Company's laboratory showed that hard nickel deposits can be produced at quite high rates. One set of conditions for this is shown in Table III.

TABLE III
Hard Nickel Plating

Solution:	Nickel Sulfate (crystals)	16 oz. per gal.
	Ammonium Sulfate	2.8 oz. per gal.
	Potassium Chloride	1.1 oz. per gal.
Temperature:	120-130°F.	
pH:	5.2-5.8 (Electrometric)	
Rate:	*Current Density* (amp./sq. ft.)	*Hardness* (Vickers)
Without agitation:	20	350-400
	35	400-450
With agitation:	25	350-400
	50	400-450

The most recent work in this laboratory indicates that a solution containing a higher chloride content than that in Table III yields about the same hardnesses, yet gives better anode corrosion at high current densities and easier control of pH. The following composition seems most promising at the present time.

Nickel sulfate (crystals) 16 oz. per gal.
Ammonium chloride 2.3 oz. per gal.
Potassium chloride 1.1 oz. per gal.
Operating conditions are the same as in Table III.

The hardest deposits, if plated in thicknesses greater than about 0.02 inch, do show a tendency to form laminations and develop cracks. Where such hardnesses are required in very thick deposits a better product is usually obtained by building-up with tough nickel of more moderate hardness and finishing with hard nickel or chromium.

[2]Macnaughtan and Hothersall: Trans. Farad. Soc. (**24.**) 387 (1928)

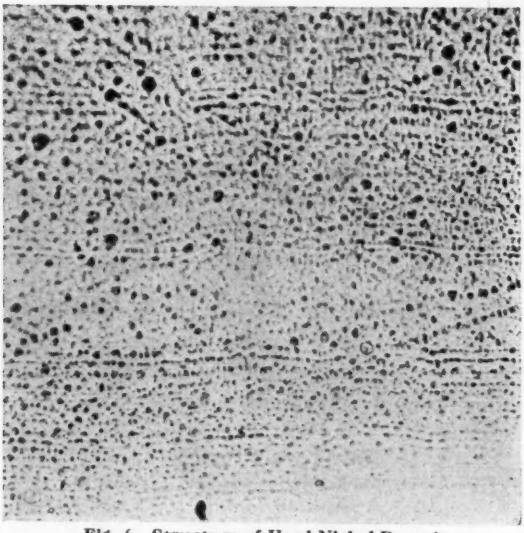


Fig. 6 Structure of Hard Nickel Deposit X500

Tensile Strength: 132,000 lb./sq. in. Elongation in 2 inches: 1%
Hardness: 360 Vickers

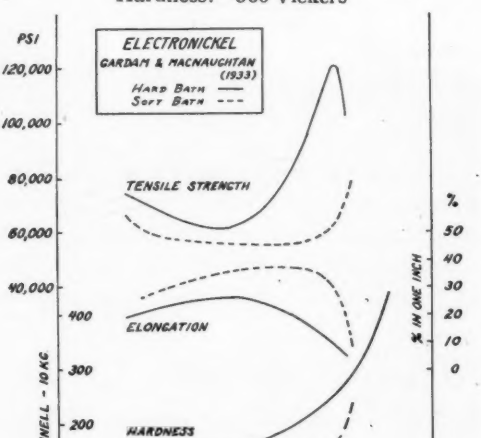


Fig. 7 Mechanical Properties of Electronickel (From Gardam and Macnaughtan)

	Hard Bath	*Soft Bath*
Nickel Sulfate: g. p. l.	120	210
Nickel Chloride: g. p l.	—	30
Boric Acid: g. p. l.	—	30
Curr't Dens.:Amps./sq.ft.	11	11
Ammonium Sulfate: g. p. l.	8	—
Potassium Chloride: g. p. l.	21	—
Temperature: °C.	35°	35°

STRUCTURE AND PHYSICAL PROPERTIES OF NICKEL DEPOSITS

In order to compare the structures of electrodeposits with other forms of nickel, photomicrographs of a nickel casting and of commercial hot-rolled nickel are shown in Figures 2 and 3, originally photographed at 100 diameters magnification. The grains are more or less equi-axed and inclusions are visible at this magnification. The illustrations of the structures of electrodeposits which follow these were made at 500 diameters because the grain sizes involved are so small.

Soft electrodeposited nickel is shown in Figure 4. There is a pronounced fibrous structure with the grains elongated in the direction of growth, that is, perpendicular to the surface of the base. Electrodeposits with a structure like this are generally considered to have a preferred crystallographic orientation in a direction normal to the base. The existence of this can be established only by X-ray examination, since the mere fact that the grains are elongated in one direction does not prove that there is a preferred orientation. As a matter of fact, a thin deposit (0.001 inch) made under the same conditions as the nickel of figure 4 did show a strongly preferred mixed orientation with both [100] and [122] directions normal to the surface. ([2a])

The tensile properties shown in Figure 4 were obtained with test-pieces cut "across the grain," that is, at right angles to the long direction of the grains. The values for tensile strength and elongation in other directions would probably be higher. The actual thickness of deposit tested was 0.023 inch. The freedom from large inclusions is noteworthy.

Figure 5 illustrates how much finer the grain size is in an even moderately hard nickel, together with the loss of the fibrous structure. Deposits like this and the hard one which follows showed random orientation.([2a])

In a considerably harder deposit, such as that shown in Figure 6, it becomes difficult to delineate any structure at all, the grain size becoming sub-microscopic. It was necessary to apply the etching reagent (cold concentrated nitric acid) much longer to this deposit than to the others to show anything at all. Due to a pitting action of the reagent at points which were probably microscopic inclusions, traces of a laminated structure are visible

(2a) Carl H. Samans, Private Communication.

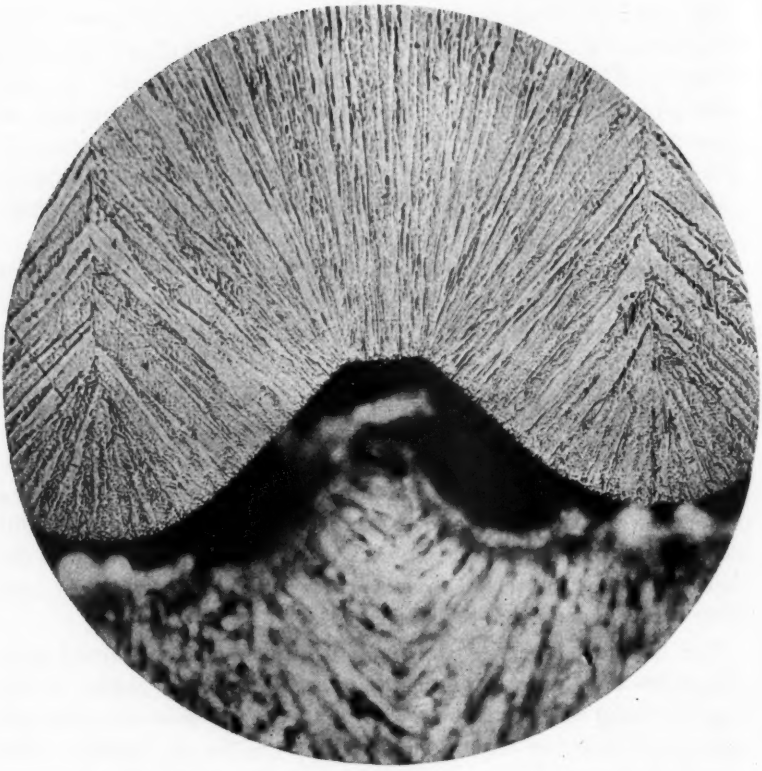


Fig. 8 Cross-Section of Sound Groove in Nickel Master Matrix X500

Fig. 11 Electroformed Nickel Strip: 0.005 x 1 inch
(C. O. Jelliff Mfg. Corp.)

in Figure 6. This is a forerunner of the real laminations which become troublesome in deposits above 450 hardness.

The tensile properties of electrodeposits, the actual structures of which have just been illustrated, are compared with those of other forms of nickel in Table IV.

TABLE IV
Mechanical Properties of Nickel

Form	*Hardness V = Vickers B = Brinnell*	*Tensile Strength*	*Elongation % 2 inches*
Cold Rolled, Annealed	100-130(B)	65,000-75,000	45-50
Cold-Rolled, Hard	180-230(B)	90,000-105,000	15-30
Castings	80-125(B)	55,000-70,000	15-30
Soft Electro	150(V)	51,000	28
Medium Electro	230(V)	98,900	21
Hard Electro	360(V)	132,000	1

It will be seen that the values for the electrodeposits indicate that they are metallurgically sound metal and that the process of making them can well be called "cold casting." Similar data reported by Gardam and Macnaughtan[3] are shown in Figure 7. They indicate that, for the current density and temperature used by the Englishmen, maximum ductility in soft nickel is obtained at hydrogen ion concentrations in the range pH 4.0 to 5.5, the elongation being as high as 37 per cent. in one inch.

Further evidence of the soundness of nickel deposits is to be found in the following measurements of density.

TABLE V
Density of Nickel

Form	*Density at 23°C.*
Cold-rolled sheet	8.86
Soft electro	8.86
Moderately hard electro	8.91
Hard electro	8.89

THEORY OF HARDNESS

The fact that electrodeposits can be prepared of much higher hardness than that of wrought forms of the same metals has intrigued many investigators. The time-honored theory that the hardness is due to the presence of hydrogen as a hydrite or in solid solution still has many adherents. The principal support for this theory is that the metals which show the most pronounced differences between hardnesses in the wrought and electrodeposited forms are also those which show the highest capacities

[3]Gardam and Macnaughtan: Trans. Farad. Soc. (**229**,) 755 (1933)

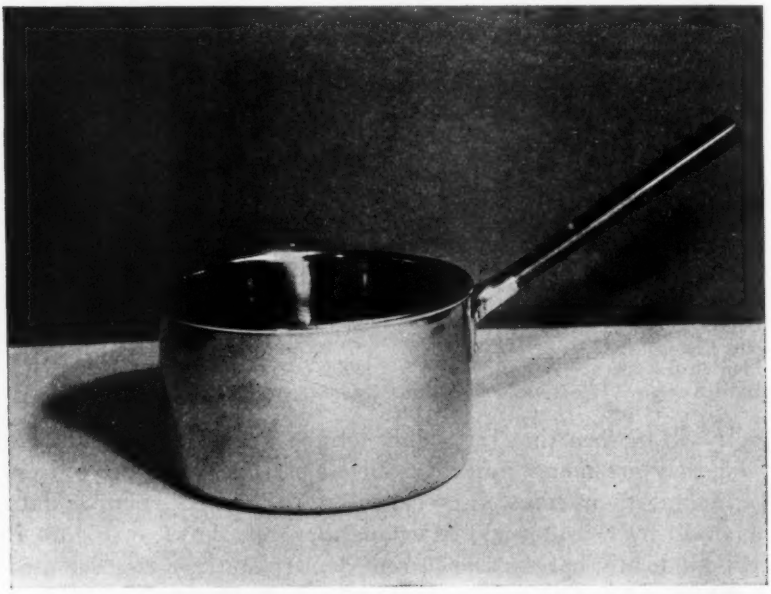


Fig. 9 7-Inch Saucepan Made from Electroformed Nickel-Copper Bimetal Sheet. N. C. Joseph, Ltd.

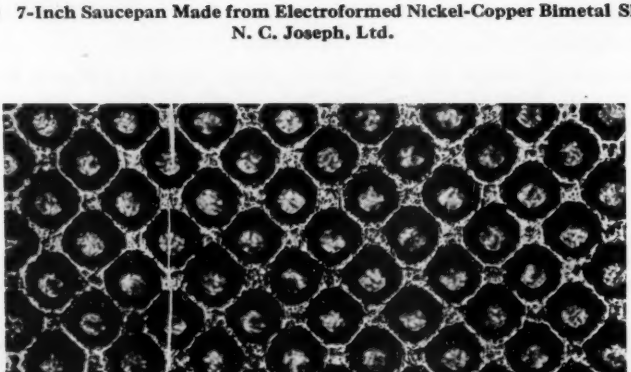


Fig. 10 Electroformed Nickel Screen 175 Mesh. 0.005 Inch Thick (C. O. Jelliff Mfg. Corp.)

to dissolve atomic hydrogen at room temperatures. Such metals are iron, cobalt, nickel, chromium and palladium. In addition, the hard deposits of some of these metals have lower softening temperatures than do their commercial wrought forms.

The principal evidence against the hydrogen theory is the following:

(1) About 90 per cent of the hydrogen present in electrodeposits can be removed by warming the metals in a vacuum without appreciable softening.[4]

(2) There is poor correlation between the hydrogen content of nickel deposits and their hardness.[5]

(3) There is always a close correlation between grain size and hardness — the harder the deposit, the finer the grain.[6]

(4) Upon annealing hard deposits at high temperatures, non-metallic inclusions become visible under the microscope in amounts which increase with increase in the initial hardness.

Macnaughtan, Gardam and Hammond[7] suggested that the hardness is due to the extremely fine grain size and that, in turn, is caused by interference with crystal growth exerted by colloidal nickel hydroxide or other basic compounds which are precipitated in the film of solution on the cathode surface and are occluded in the deposit. Desch suggested to Macnaughtan an additional idea which appeals to metallurgists, namely, that the hardness is not controlled solely by grain size but may also be increased by the presence of the non-metallic particles in a critical state of dispersion. These interfere with slip and cause hardness of the type developed in precipitation-hardened alloys such as Duralumin.

EFFECT OF TEMPERATURE

Hard nickel deposits have a lower softening temperature than wrought nickel. This is to be expected because the electrodeposits are not only quite pure, as compared with commercial nickel, but also are extremely fine-grained and are in a condition of high internal stress. The following table shows the effects of temperature upon the hardness (Vickers) of nickel coatings.

---

[4]Guichard, Clausmann, Billon and Lanthony. Compt. rend. **196**, 1660 (1933)
[5]A. Brenner. J. Res. Nat. Bur. Stand. **18**, 565 (1937)
[6]Macnaughtan and Hammond. Trans. Farad. Soc. **27**, 633 (1931)
[7]Macnaughtan, Gardam and Hammond. Trans. Farad. Soc. **29**, 279 (1933)

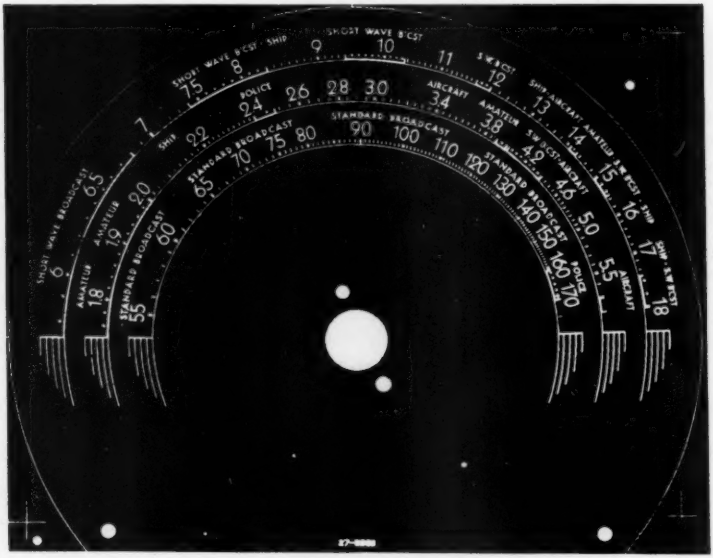


Fig. 12 Electroformed Radio Dial
(C O. Jelliff Mfg. Corp.)

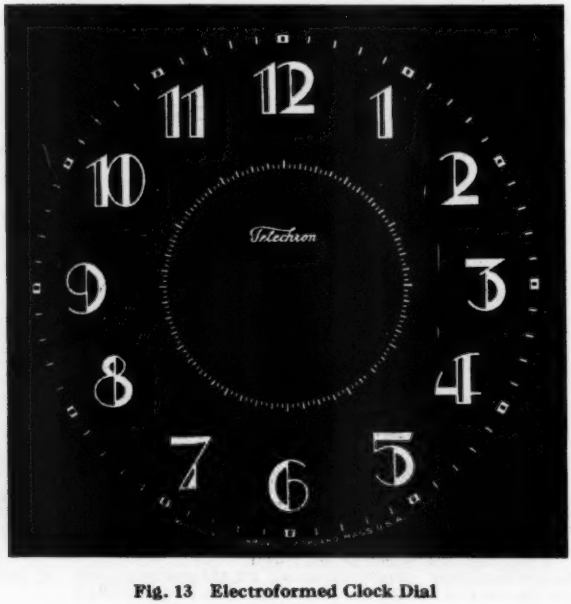


Fig. 13 Electroformed Clock Dial

Initial Hardness	*Time hrs.*	*Temp. °F.*	*Final Hardness*
325	18	400	295
325	1 week	400	295
325	18	500	295
470	24	500	400-450
475	4	600	222
445	4	600	380

From these results it can be concluded that nickel deposits can be counted upon to retain high hardness of the range 300 to 450 at temperature below 500°F.

At ordinary temperatures such deposits retain their hardness indefinitely, just as does chromium. Nickel of 470 Vickers, made in 1934, still shows the same hardness today.

ENGINEERING OR MECHANICAL USES OF NICKEL DEPOSITS

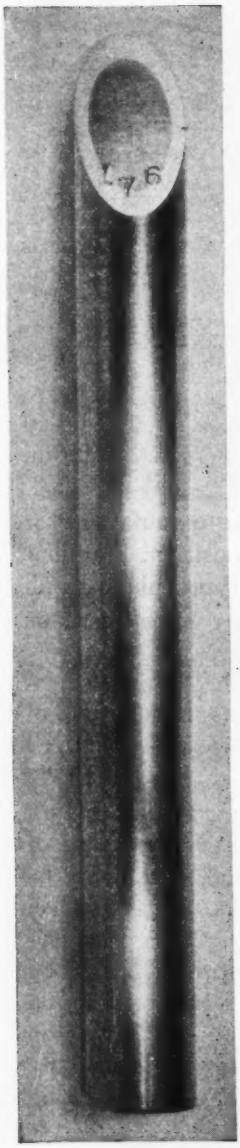
The uses of heavy nickel deposits depend upon good physical properties combined with resistance to wear or corrosion or both. They fall into two categories:

(1) *Electroforming* may be defined as the manufacture or reproduction of articles by electrodeposition. Familiar examples of such products are electrotypes, phonograph record matrices and medals. "Electro-casting" perhaps conveys the idea better to metallurgists.

(2) *Building-up* or *surfacing* is distinguished from electroforming by the fact that the deposit is made a part of the object upon which it is cast rather than removed from it for separate use. *Electrotyping.*

Electrotyping is a method of reproducing printing plates. For the ordinary classes of work the electrotypes are made of copper, nickel being used only in the form of a thin coating on the printing surface to resist wear or corrosive inks. Heavy nickel deposits are used, however, at the Bureau of Printing and Engraving in Washington where the plates used for printing currency are built up from hand engraved master plates by deposition of a layer of nickel about 0.01 inch thick, backed by a heavy iron deposit. A thin layer of chromium, not sufficient to cause any loss of detail in the engraved lines is put on the nickel printing face after the plate is removed from the master.

It is interesting to note how faithfully the surface of a master or mold can be reproduced by the nickel deposit. Blum and



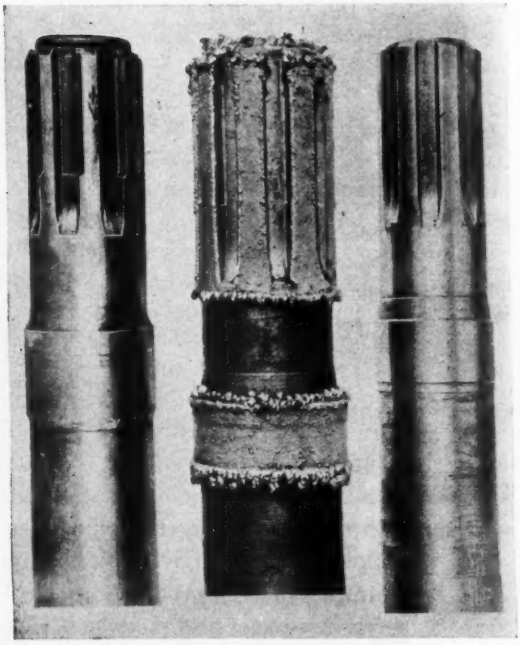


Fig. 15 Repair of Worn Spline Shafts
(Fescol, Ltd.)

Fig. 14 Heavy Soft Nickel Deposit on Steel
Deposit: 1/8 inch thick

Hogaboom[8] state that not only the finest engraver's marks 0.00002 inch wide, but also the faintest scratches visible under the microscope are exactly reproduced by the depositing nickel.

Phonograph Record Plates

Reproduction of phonograph master and stamping plates is similar in principle to electrotyping. In both processes the object is to produce a sound, mechanically strong metal object whose surface exactly reproduces all the details of the original mold. Figure 8 shows a cross-section of one sound groove in a nickel master matrix used for making high fidelity phonograph records. When one considers that this metal is formed cold, with a grain structure so much finer than the contours of the record groove itself, it is easy to understand why better reproduction of the surface can be achieved by electrodeposition than by any other metal forming process.

Electroformed Sheet

Electroformed copper tubes have been made commercially and electroformed copper sheet is available in this country in light gauges where the price of the rolled product is relatively high on a pound basis. A bi-metal sheet is being made electrolytically in England for the manufacture of kitchen utensils. Figure 9 is a photograph of a 7-inch sauce pan drawn from 0.031 inch sheet consisting of a layer of nickel, used on the inside of the utensils, and a layer of copper on the outside. This illustrates how high the metallurgical quality of electroformed sheet can be made without the benefit of forging or rolling treatments.

An outstanding new application of electroforming is involved in making screens by direct deposition of copper or nickel. There are at least two plants already in operation in this country which can build up any size of fine mesh screen or perforated sheet of almost any design which is capable of photographic reproduction. Thicknesses are suitable for decorative and for industrial use. The advantages of the process of making screens by electrodeposition are high accuracy in the size of opening, flexibility in choice of relative area of perforations and metal, enhanced corrosion resistance due to elimination of concentration cell action

[8]Blum and Hogaboom: "Principles of Electroplating and Electroforming," N. Y. (1930) p. 156

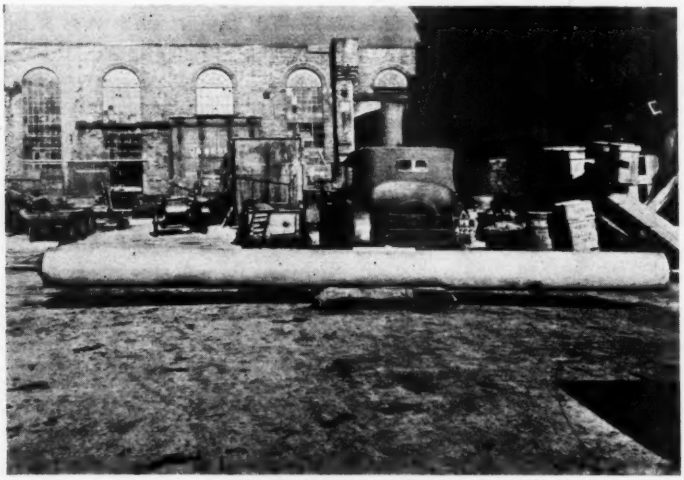
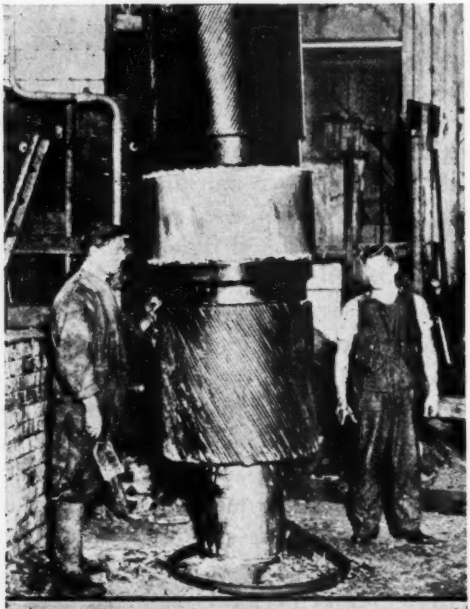


Fig. 16 Fescolized Steel Tube Roll For Paper Mill



This second reduction, turbine gear shaft weighing 8½ tons indicates how nickel plating can be utilized to build up worn sections. The Fescol process deposited the nickel coating in the center.

Fig. 17 Turbine Gear Shaft Repaired By Fescolizing

in the crevices between overlapping wires, and better resistance to wear and fatigue due to the elimination of the wire knuckles.

Figure 10 is a photomicrograph of an electroformed nickel screen of 175 mesh.

Figure 11 shows a perforated nickel strip only 0.005 inch thick. Thin gauges of strip can be made cheaper by electroforming than by rolling because the cost and scrap losses incident to repeated rolling and annealing are eliminated. The perforations are "cast" in the metal rather than stamped out.

Figure 12 illustrates a radio dial with perforated numerals as it would look when illuminated from the rear. Figure 13 shows a similar dial for a clock.

BUILDING-UP AND SURFACING

While it is often cheaper to scrap standard machine parts which have been worn or which were accidentally machined undersize, there are many cases involving more complicated, special or expensive parts where reclamation is economical. One machine plant in New England has a scrap pile containing hundreds of parts of automatic machines which cannot be used because a machinist's error of only a few mils rendered them unfit for use in precision or high speed equipment. Some of these parts cost over a hundred dollars each.

The salvaging of worn and mismachined parts has been carried on by the Fescol Company in England for almost twenty years. They have two plants there and a new one in France. In the United States some work has been done with electrodeposited iron at the Westinghouse plant in East Pittsburgh but more general interest has been aroused only recently.

British experience has been that old machine parts can be repaired cheaply and often give longer life than a new part due to improved wear resistance. It should be noted again that even where the wearing surface must be of chromium, the English prefer to build up thick layers more rapidly with nickel to provide a tough supporting layer for the final thinner chromium coat.

A list of parts to which heavy plating has been applied for salvaging after wear or correcting machining errors is given in Table VI. Profitable use of nickel coatings on new parts has been made for many of the applications shown.

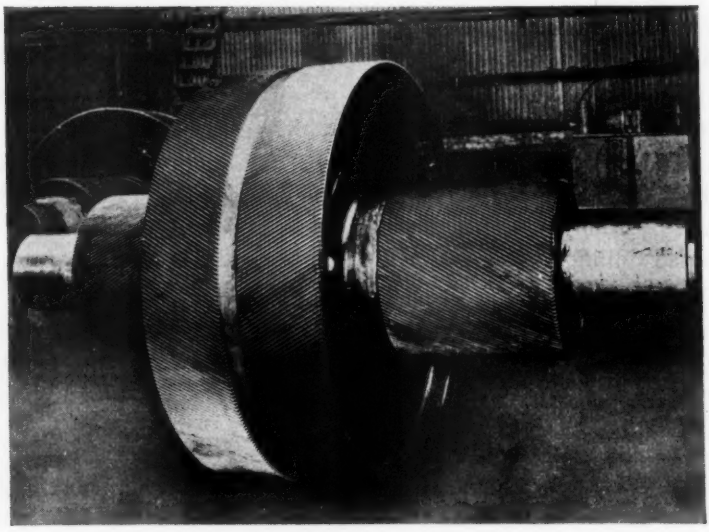


Fig. 18 Turbine Gear After Repair

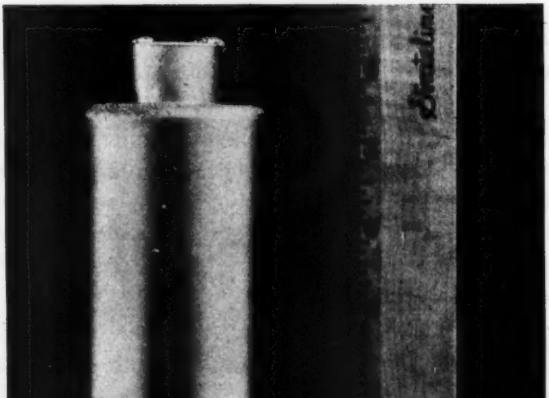


Fig. 21 Chemical Pump Plunger

In the power field especially, savings have been accomplished by restoring worn parts from service in super-heated steam. The temperature coefficient of nickel is so close to that of steel that no difficulty has been experienced similar to that sometimes caused by the large difference in coefficient of chromium as compared with that of steel. The values for temperature coefficient of expansion in the range 25°-100° Centigrade are nickel 0.0000133, steel 0.0000118 and chromium 0.0000082. This advantage, together with the good resistance of nickel to corrosion and oxidation at moderately elevated temperatures accounts for the success of nickel-coated steel for use as glass lehr rolls.

Worn armature shafts have been repaired without removal of the windings. A large user of refrigeration compressors has found that by building up worn compressor rods, only one size of rods and gland packings need be kept in stock, instead of turning down rods and using smaller packings. The nickel-coated rods last longer and the packings last longer on such rods.

Some of the applications in Table VI depend upon a combined resistance to wear and corrosion of the coating. Such are the pump parts (when the fluid to be pumped is corrosive), the cams for viscose machinery which are called upon to resist wear while operating completely submerged in corrosive solutions, and paper mill rolls and printing rolls (if the inks are corrosive).

ACKNOWLEDGMENT

The measurements quoted and the plated parts illustrated in this paper, except those specifically credited to others, were made by E. J. Roehl and J. W. Carey of the International Nickel Company Research Laboratory. Their assistance is gratefully acknowledged.

PHOTOGRAPHS ILLUSTRATING SALVAGING AND SURFACING

Figure 14. "Heavy Nickel Deposit on Steel Rod." This deposit is of soft nickel 1/8 inch thick and illustrates the excellent appearance of the surface after machining.

Figure 15. "Repair of Worn Spline Shafts." From left to right: (a) when worn, (b) similar shaft after being built up with nickel, (c) finished machined. Courtesy Fescol, Ltd.

Figure 16. "Fescolized Steel Tube Roll for Paper Mill." Length: 20 feet, 3 inches. Nickel coated. Courtesy of Fescol, Ltd.

Figure 17. "Second Reduction Turbine Gear Shaft Repaired by Fescolizing." Appearance before machining. Thickness of nickel deposit 1/4 inch. Courtesy Fescol, Ltd.

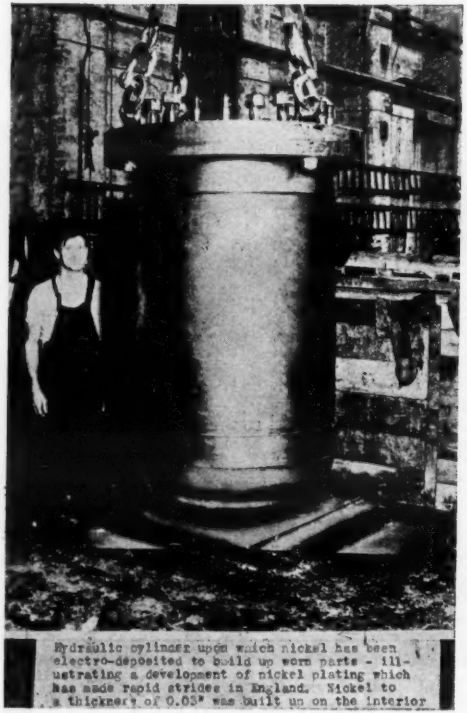

Hydraulic cylinder upon which nickel has been electro-deposited to build up worn parts - illustrating a development of nickel plating which has made rapid strides in England. Nickel to a thickness of 0.03" was built up on the interior

Fig. 19 Hydraulic Cylinder
(Courtesy Fescol, Ltd.)

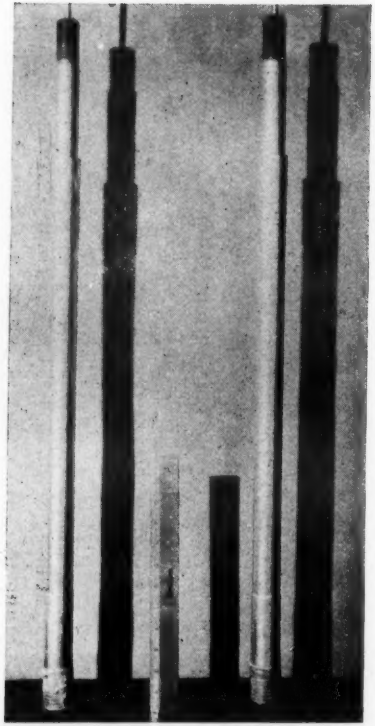


Fig. 20 Reflux Pump Rods

Figure 18. "Second Reduction Turbine Gear." Shown at completion of job. This was one of four sets treated for one of the largest vessels of the P&O Shipping Company's line. Due to rocking on its key the six-foot diameter wheel worked loose. The shafts were 11 ft. long and weighed 8 1/2 tons each. Fescol repaired the shafts in 20 days, whereas several months would have been required to get new shafts.

Figure 19. "Hydraulic Cylinder." Nickel has been electrodeposited to a thickness of 0.03 inch on the interior of this cylinder to take up wear. Courtesy Fescol, Ltd.

Figure 20. "Reflux Pump Rods." Coated with hard nickel deposit 0.010 inch thick. Hardness: 440 Vickers — For use in an American oil refinery. Shown as plated.

Figure 21. "Chemical Pump Plunger." Coated with a hard nickel deposit 0.021 inch thick of hardness 450 Vickers.

Figure 22. "Printing Press Cooling Rolls." Steel tubing heavily nickel- and chromium-plated. Length of face 80 inches. Diameter 10 inches. Plated and finished by the Chromium Corporation of America.

TABLE VI

Parts Coated with Heavy Nickel Deposits

1. TO IMPROVE NEW PARTS
2. TO SALVAGE MISMACHINED PARTS
3. TO SALVAGE WORN PARTS

ARMATURE SHAFTS	HYDRAULIC RAMS
COMPRESSOR RODS	VALVE STEMS
PUMPS SHAFTS	WRIST PINS
PUMP SLEEVES	LATHE BEDS
PUMP RODS	LATHE SADDLES
PUMP PLUNGERS	SPLINED SHAFTS
TEXTILE SPINDLES	LITHOGRAPH ROLLS
GLASS LEHR ROLLS	PAPER MILL ROLLS

ELECTRIC MOTOR END FRAMES (MISMACHINED)
CAMS FOR VISCOSE MFG. MACHINERY
DIESEL CRANKSHAFT PIN BEARINGS
EXPANSION SLEEVES (SUPERHEATED STEAM)
PISTON ROD BEARINGS
TEXTILE PRINTING ROLLS
TURBINE GEAR SHAFTS

(Courtesy Fescol, Ltd.)

Fig. 22 Printing Press Cooling Rolls
(Chromium Corp. of America)

Bright Nickel Plating

By R. J. GREEN

Member of Detroit Branch

SOME of the many requirements of this type of bath are — the bath should be reliable, stable etc., the pH range should be flexible enough to withstand sudden changes in temperature; it must adhere firmly to the base metal or under coat; it should be better, if possible, than an ordinary bath for protection against erosion; it should be bright enough on leaving the nickel bath to plate directly in the chromium, or to stand several hours or days and then chromium plate successfully.

A solution containing the following compositions may be used:

Single nickel salts, 8 oz/gal.
Nickel chloride, 4.5 oz/gal.
Boric acid, 4.5 oz/gal.
Brightener, 1-1/2 to 2% by volume.
Range of pH from 3.7 to 4.5, temperature 120 degrees F.

The following notes cover some of my experiences in operating and controlling several baths of the above type. The metals plated were stamped steel articles and stamped brass articles. The same cycle of cleaning applies to both, but with the brass the cleaners are milder. There is one difference between bright nickel plating and ordinary nickel plating that is very marked, and it is that in the former the articles to be plated must be *chemically clean*. Therefore one must use care in setting up a cleaning cycle. There are many cleaners on the market that will answer the purpose very well. The rinse waters should receive close attention, as they are liable to become contaminated. One should have a separate rinse for every operation. In my experience I have found that a little care in the cleaning cycle will cut down on rejections. To discuss fully the methods used for cleaning would require too much space, and there are so many that it is difficult to suggest one that would be acceptable to all. I would recommend that those who are wondering what kind of a cleaning cycle to set up consult their local alkali representative.

In order to determine the pH of the type of solution we are discussing we must have a Quinhydrone-Calomet-Electrode set, as the color of the solution in question is black and it is very difficult to determine the correct pH with a colorimetric set. However, the determination of the pH is very easily accomplished, and it has the advantage of doing away with reliance on the human eyesight. Very few persons will identify the same color, and in production work, where the solutions are controlled by chemical analysis, the correct pH is an advantage.

The stability of the bath is very good. If one will keep the bath under chemical control, no trouble will be encountered in operation.

The temperature of the bath should be kept at the best operating range. I have found a temperature of 120 degrees F. to be all right, and in another bath perhaps 125 will be better. One should determine the temperature of the bath by close observation for the brightest plating, and if it should be 120 F. or 130 F., then that is the place to keep it.

The adherence of the bright nickel to a base metal or an undercoat depends upon just how well the article has been cleaned, and also upon a properly balanced bath. If the article to be plated is chemically clean on entering the nickel bath, and the bath is at the correct pH., etc., there is no reason why the plate should not adhere firmly. I have traced non-adherence directly to improper cleaning - I mean by that contaminated rinse waters. One cannot be too careful in the cleaning operations. To those of you who are interested, I will forward notes on the methods I have been using to clean both brass and steel.

As to the protection against erosion, we know that work that has been copper plated and colored, and nickel plated and nickel colored, and then chromium plated, will be as good a protector against erosion as one could wish for. However, the cost of such a method of plating, especially in the automobile business, is prohibitive. Now in a bright nickel solution we use a hot nickel and a comparatively low pH, and we get a finer grained structure of metal; and due to the brightness of the bath, we can plate to practically any desired thickness, and the thickness of the plate has a great deal to do with the protection against erosion.

One should use a little more care in the polishing operation. The finish obtained in the polishing room is the finish you are going to get in the bright nickel bath. The baths are somewhat similar to chromium plating in that respect.

In reviewing these notes, it might seem at first glance that the cost of installing new equipment and preparing to operate bright nickel plating solutions would be excessive. But such is not the case. In fact the installation of bright nickel plating in most plants is merely the addition of the brightener; and for those of you to whom it may mean additional equipment, when you realize that in all brass work you can make your first polishing operation your last, and there will be no return to the buffing room for color and no extra handling; and if care is used in preparing the steel, there will be no need of coloring the nickel plated steel, you will no doubt readily see that it will pay you to operate with bright nickel solutions.

ANNUAL OUTING

Bridgeport Branch

American Electro-Platers' Society

SATURDAY, SEPTEMBER 10, 1938

EICHNER'S GROVE, TRUMBULL

Directions posted from Beardsley Park entrance, Noble Avenue. Bring the Ladies. Buffet Lunch begins at 12. The Barbecue Chicken Dinner De Luxe goes on at 4.30. Refreshments. All for $2.00 a person. The Branch assumes part of the costs of outing. Games. Prizes.

Messers. Schlitz and Budweiser will be guests of honor.

Polishing *and* Buffing *of* Zinc Base Die Castings *and* Aluminum Die Castings

By T. C. EICHSTAEDT

Secretary and Treasurer of Detroit Branch

I SHALL herewith endeavor to give the operations necessary in securing or obtaining a high lustre finish on the aforesaid castings. I shall, however, treat them separately and first go into the operations necessary on the zinc base die castings. These castings have improved greatly during the last few years and when they come from the caster free from pits and chills there is nothing to it excepting that the burrs be taken off and then given a good buffing and coloring operation. The polishing wheels necessary for the burring operation depends largely upon the amount or the size of the burr. Ordinarily 140 grain or 120 grain is all that is necessary. If, however, 120 grain is used it will necessitate using a finer grain as the 120 emery marks or grain marks are not very easily removed with the buff. The best grain for the second operation is then a number 180 grain. In all the polishing operations on these castings it is necessary to use an abundance of grease stick and the pressure will be governed, of course, by the amount of polishing which has to be done. It should be borne in mind though that no hard pressure should ever be used in the polishing operation on zinc base die castings because if there is too much pressure exerted the emery marks caused by the heating of the casting will be deep and instead of polishing you will get a dragging operation or tearing of the metal. All these castings should be handled carefully in all operations as the metal is soft and they are easily nicked and marred. After the polishing is done they are then ready to be buffed. In selecting a polishing wheel for the aforesaid operations, all depends upon the shape and the size of the castings at hand. If there is much polishing to be done a sheep skin wheel is preferable and never any coarser grain than 140 should be used. For the burring operation either a compress canvas wheel or a good

substantial polishing wheel made up of buffs such as the Universal or cloth flex wheel is preferable.

For buffing operations there can be no given rule applied to cover all classes and sizes and shapes. There are many different kinds of buffing wheel and a little experimenting with different kinds one can easily determine the most efficient wheel for the job in hand. The buffing composition, however, to be used in buffing these die castings can be also determined by a little experimenting although I have used for the last ten years a combination composition which is called Cut and Coloring composition which is a tripoli composition. Ordinarily on small die castings this Cut and Coloring operation can be done in one handling on the one wheel after it has been cut down it can be just colored by going lightly on the same wheel. Caution should be used in the amount of pressure used in the operation of buffing. If too much pressure is exerted the casting becomes overheated and as it is soft there will be a dragging effect which will look like grain marks in the work and if more pressure is exerted the casting becomes soft and the marks will be wavy, not smooth. Right here it might be stated that there are very few buffers who really understand buffing die castings and a great deal of work can be ruined just in the buffing. On larger die castings though we'll say for instance radiator grills, wind shield posts and such it will probably be necessary to do a real good fine polishing operation on these before buffing and the finer grain that can be used the better will be the finish and the easier to buff as abundance of grease must be constantly used in this polishing operation. Occasionally an application of lump pumicstone to the wheel in order to clean the wheel from grease and the zinc which adheres and fills the wheel is necessary, then, of course, an abundance of grease is applied before the polishing operation is continued. Then on the buffing of these larger castings it would probably be necessary to give them a cutting down operation and a coloring operation but it is not necessary to do this coloring operation on a separate wheel. It can be done better and more efficient on the same wheel that it is cut down on as soon as it has been cut down as the casting is still warm and will color up better on account of that.

A satin finish commonly known and called Butler finish on zinc

base die castings is quite in demand and it has been my experience that there are hardly two concerns who are finishing this finish who get the same results or in other words they do not match up. It has been my experience in doing this work that the best way to obtain a Butler finish is to buff the castings first and then have them buffed on a smaller wheel with a slower speed and using a greaseless buffing composition such as Lea compounds. The wheel used in this operation should not be over 10″ in diameter and the speed should not be over 1800 r.p.m. Care should be taken that not too much pressure is used in this operation and also that a sufficient amount of the compound be applied to the wheel. If the pressure is too great there will be an overheating and as the compound is of a sticky nature the compound will adhere to the work and will not give an evenly smooth finish. It is also necessary to use the proper grain in this compound as this compound is a composition of a groove and abrasive and there are different sizes for different finishes. The writer has found it very sufficient to use a #96 compound for the operation before plating and after plating use a #4. If the finish is not obtained on the work before plating you can not obtain the proper finish after the article is plated and if it is properly finished before plating and a bright nickel solution is being used it will not be necessary to have it buffed after nickel plating but if a bright nickel is not used then it will be necessary to have the operation done with a #4 compound on a smaller wheel say not over an 8″ wheel made up of full disc loose buff and the speed should not be over 1200 r.p.m.

ALUMINUM DIE CASTINGS

These castings are peculiar and are not as easily finished as zinc base die castings are. It will be found necessary in removing the fins and the mold dividing mark on these castings with grain not finer than 120 and abundance of grease should be constantly applied in this operation and instead of a lot of pressure being used the judgment of the operator can easily decide the best pressure. After the fins and mold marks have been removed it is necessary to polish the castings all over wherever they are to be finished to a high lustre or even if they are to be a satin finish for it seems that the die casting of aluminum has not been perfected as much as the zinc base die castings have and there seems to be a sort of a scale or skin on the aluminum die casting which has to be

removed in a polishing operation before it will buff up to a high lustre. Here again there is no given rule that can be followed in the selection of a polishing wheel for these operations. It all depends upon the size and the shape of the casting and a little experimenting will determine in a short while which is the best kind of wheel to use but there is one rule that can be laid down and should be adhered to in both zinc base die castings and aluminum die castings, never should a soft ragged wheel be used in the polishing operation. A wheel that is hard and just resilient enough to give to the contour of the casting is the best kind of a wheel to use. But in the polishing after the fins have been removed wherever possible a sheepskin wheel is the best kind and as stated before 180 grain with an abundant application of grease and if the casting is of a very large kind after the 180 operation a 240 is necessary in order to make the buffing operation much easier. It is not so easy in buffing the aluminum die castings and coloring them in one operation. It is better to cut them down on a good fast cutting greasy tripoli and then use a loose full disc soft buff for the coloring operation. Here again the selection of a coloring composition can best be determined by consulting your composition manufacturer who will furnish you with a variety of samples and you can select the one most efficient for the operation at hand. Sometimes it is necessary after the cutting down operation to have the castings washed and get them entirely free from the grease of the polishing and cutting down operations before coloring. If this is done then the coloring operation is much easier and as the coloring operation should not in any way soil the work it is then ready for assembly or wrapping up whichever is necessary. There is no given rule or no best wheel which can be recommended for the buffing of these aluminum die castings. This will have to be determined by the man in charge and the size and the shape of the casting. There are many different grades of aluminum die castings, some are hard, almost as hard as flint and others are medium and some are soft. Therefore one cannot set any rule as to what is the best procedure on all aluminum die castings for the polishing or the buffing operations.

For the Butler finish or satin finish on aluminum base die castings the same operations that were used or recommended for the zinc base die castings can not be used. Aluminum does not

lend itself to a greaseless compound. Instead of getting the brush or Butler effect you will get a matt effect. The best way or the most efficient way that the writer has found to obtain or produce a Butler or satin finish on aluminum is to finish the aluminum right up to the coloring operation on a buff and then the next operation after the cleaning of the casting can be done on a steel scratch brush not over 8″ in diameter and at a speed not exceeding 1500 r.p.m. No grease or any composition of any kind is used or applied to this brush. A piece of lump pumicestone can be applied to the brush occasionally in order to keep the brush clean. Care must be exerted to see that there is not too much pressure used on the aluminum and care should also be used in keeping the scratch brush marks all running one way in order to give the desired satin finish and one must keep their fingers off the article after it is finished for a finger mark on the aluminum will not wipe off and it will be necessary to put it on the scratch brush again to remove the finger marks. One can wear soft gloves in the operation and also those who handle the work after can do the same.

SPEAKERS TO ADDRESS THE DETROIT BRANCH OF THE AMERICAN ELECTRO-PLATERS' SOCIETY

September 10th — Mr. H. R. Norgren, Special Representative Detroit Rex Products Company, Detroit, Michigan. Subject: *Modern Developments in Vapor Degreasing*, illustrated with motion picture film.

October 8th — Mr. R. J. Amberg, Sales Representative Johns-Manville, Detroit, Michigan. Subject: *Celite Filter Aids*, illustrated by a talking motion picture describing the formation, mining and properties of the product.

November 4th — Dr. A. Kenneth Graham, Consulting Engineer, Jenkintown, Pennsylvania. Subject: *Rochelle Salt Copper Plating Baths.*

December 2nd — Dr. Colin G. Fink, Professor of Electrochemistry, Columbia University, New York City. Subject to be announced later.

T. C. EICHSTAEDT, *Sec.-Treas.*

REPORT OF THE EXECUTIVE SECRETARY
From June 1, 1937 to May 31, 1938

These reports will give the membership full information regarding our finances and branch statistics for the fiscal year.

W. J. R. KENNEDY, *Executive Secretary.*

ANNUAL STATEMENT
AMERICAN ELECTRO-PLATERS' SOCIETY
Year Ending May 31, 1938

RECEIPTS:

Sale of Advertising in REVIEW	$ 7522.76
Per Capita Tax and Supplies	3404.23
Sale of REVIEWS	130.00
Sale of Convention Proceedings	1007.90
Printing Mr. Hogaboom's Paper Including Cuts	75.00
General Spring Bumper Company for Printing Paper	15.00
Refund from Railway Express	2.46
English Check for Membership	11.00
Gift from New York Branch	300.00
Deposited for Springfield Branch	167.50
Total Receipts	$12635.85
Balance from Last Year	3874.10
	$16509.95

EXPENDITURES:

Printing and Mailing REVIEW	$ 5091.82
Executive Secretary's Salary	2569.10
Executive Secretary's Traveling Expenses	525.00
Printing Supplies and Cuts	299.24
Printing Officers' Stationery	98.02
Executive Secretary's Office Postage, Mailing, Post Office Deposits	102.65
Printing, Planographing, and Express	68.36
Printing Convention Proceedings	1022.47
Officers' Mileage to Convention	255.35
Collector of Internal Revenue	45.40
Officers' Expenses	60.74
Mr. Eichstaedt $2.85	
Mr. Goodsell 9.60	
Mr. Fletcher 40.05	
Mr. MacStoker 8.24	
$60.74	
W. H. Porter, Mimeographing	15.00
Typing Services	40.00
Bonding	25.00
Iron & Steel Publishing Co. (Stamps for Adv. N. Y. Conv.)	30.00
H. S. Sanderson, Auditing	10.00
Moore-Cottrell — Refund	4.00
Copyright of Proceedings	10.00
Flowers for Mr. Guilfoile	10.00
Sale of Proceedings Electrodepositor's Conference (English)	32.26
Montreal Check (Disputed)	12.08
Printing G. B. Hogaboom's paper	65.00
Outstanding Check May 1937	168.42
Exchange on Checks	.39
Checks to Cover Deposits for Springfield Branch	167.50
T. F. Slattery Office Expenses (Revision Committee)	75.03

Gold Medals		22.00
Check for Membership in Springfield Branch		22.00
Milwaukee Convention Advertising		100.00
Bank Exchange Montreal and Toronto		.58
		$10947.41
Total Receipts	$16,509.95	
Total Expenditures	10,947.41	
	$ 5,562.54	
Outstanding Check	123.03	
	$ 5,685.57	
Bank Balance June 1, 1938		$5,685.57
Total Receipts for 1937-38		$12,635.85
Balance from Last Year		3,874.10
GRAND TOTAL		$16,509.95

AMERICAN ELECTROPLATERS' SOCIETY
ACCOUNTS RECEIVABLE FROM THE BRANCHES AND AMOUNTS PAID
June 1, 1937 to May 31, 1938

BRANCH	Per Capita Tax	Convention Reports and Supplies	Cash Received	Balance Due
Anderson	75.60	6.75	82.35	
Baltimore-Washington	121.86	9.75	131.61	
Binghamton-Elmira	47.78	8.25	56.03	
Boston	176.40	14.25	190.65	
Bridgeport	102.39	11.25	113.64	
Buffalo	17.85	5.50	23.35	
Chicago	389.55	20.25	409.80	
Cincinnati	32.53	6.75	39.28	
Cleveland	87.69	8.25	95.94	
Dayton	90.35	11.25	101.60	
Detroit	281.37	17.39	298.76	
Grand Rapids	49.91	6.75	56.66	
Hartford	77.70	9.75	87.45	
Los Angeles	100.81	11.25	112.06	
Milwaukee	149.11	9.75	158.86	
Montreal	26.84	8.25	34.59	
Newark	171.03	12.75	183.78	
New York	202.65	11.25	213.90	
New Haven	144.82	21.83	166.65	
Philadelphia	212.63	14.25	226.88	
Pittsburgh	56.72	7.25	63.97	
Providence	56.65	9.75	65.40	
Rochester	123.93	9.75	133.68	
San Francisco	18.38	6.75	25.13	14.10
Springfield	71.95	6.75	78.70	
St. Louis	79.80	5.25	85.05	
Toledo	67.21	6.75	73.96	
Toronto	112.88	5.25	118.13	
Waterbury	101.53	9.75	111.28	
TOTAL	$3246.42	$292.72	$3539.14	$14.10

AMERICAN ELECTRO-PLATERS' SOCIETY
REPORT OF MEMBERSHIP TURNOVER
For the Year Ending May 31st, 1938

BRANCH	Members May 31, 1937	Elected	Re-instated	Gain by Transfer	Loss by Transfer	Suspended	Resigned	Died	Total May 31, 1938	Net Gain	Net Loss
Anderson	37		1			3	1		34		3
Balto-Washington	61					3	7		51		10
Binghamton-Elmira	22	3		1		3		1	22		
Boston	81	18		1	2	7	1		90	9	
Bridgeport	48	6			1		1		52	4	
Buffalo (New Branch)		21		3					24		
Chicago	176	20	3	1		6		5	189	13	
Cincinnati	15	1	1						17	2	
Cleveland	42	7			2	2		1	44	2	
Dayton	48	10	1		1	10		1	47		1
Detroit	124	21	1	3	3	2			144	20	
Grand Rapids	24	4	1	1		4			26	2	
Hartford	34	7		1	1	1			40	6	
Los Angeles	47	3		1	1	1	1	1	47		
Milwaukee	63	20	2			1	2	2	80	17	
Montreal	13	2	1			1			15	2	
Newark	79	16	1			5	1		90	11	
New York	92	11	1			3	2	2	97	5	
New Haven	48	41		1	1				89	41	
Philadelphia	110	17			1	15	2	1	108		2
Pittsburgh	27	1			1				27		
Providence	24	9		1					34	10	
Rochester	55	10	1	1	3				64	9	
San Francisco	17	7							24	7	
Springfield	33	3							36	3	
St. Louis	38					1			37	1	
Toledo	29	5				1			33	4	
Toronto	56	5			1	4	2		54		2
Waterbury	48	7			1		1	1	52	4	
	1491	275	14	15	19	73	21	15	1667	172	18

AMERICAN ELECTROPLATERS' SOCIETY RESEARCH FUND
June 1, 1937 to May 31, 1938

Bank Balance, June 1, 1937		$4447.51
Receipts	$3840.04	
Total		$8287.55
Disbursements		
Mr. Strausser, Salary	$3406.50	
Mr. Strausser, Traveling	60.00	
Mr. Huff, Salary	533.25	
Internal Revenue	73.50	
Marion Juke, Typing	5.00	
W. J. R. Kennedy, Postage	6.50	
Dr. Blum, Traveling expenses	300.00	
J. E. Stewart, Printing	19.30	
W. J. R. Kennedy, Traveling	40.00	
F. J. MacStoker (Check sent by mistake intended for New York Convention program)	60.00	
Research stationery etc. (Mr. Sage)	34.50	
Standard Accident Insurance Co.	1.80	
Industrial Filter Co.	188.50	
District Agency Insurance	45.27	
Membership, A.S.T.M.	30.00	
Bank Exchange	.25	
	$4804.37	$3483.18
Outstanding Checks	155.66	
Bank Balance, May 31, 1938 at the Union Trust Company, Springfield, Mass.		$3327.52

RESEARCH FUND RECEIPTS
June 1, 1937 to May 31, 1938

1937			
June	1	Ritter Dental Mfg. Company	$ 25.00
"	1	Bastian Blessing Co.	10.00
"	4	The Regina Corp.	25.00
"	4	Trefani Bruesmann	10.00
"	4	Specialty Brass	15.00
"	4	Grand Rapids Metalcraft	25.00
"	5	Emil J. Paidar Company	10.00
"	5	Detroit Plating Co.	25.00
"	5	W. D. Allen Mfg. Co.	25.00
"	5	Great Lakes Plating	25.00
"	5	Driscoll & Company	10.00
"	5	Arrow Plating Company	5.00
"	7	Rockford Metal Company	15.00
"	7	Mechanical Plating	20.00
"	9	Lustra Coated Sheet Company	25.00
"	10	Young Radiator Company	15.00
"	10	The Auto Sun Prod. Co.	10.00
"	10	Cincinnati Branch	25.00
"	10	The Lobdell Company	15.00
"	10	The Modern Plating Company	10.00
"	10	Carey McCall Co., Inc.	25.00
"	10	The Bullard Company	10.00
"	10	The Taylor Instrument Company	50.00
"	10	Metropolitan Motors Ltd.	50.00
"	12	Mercil & Sons	25.00
"	12	LaSalco, Inc.	25.00

June 12	Knight Plating Works	25.00
" 12	Canada Cycle Motor	25.00
" 12	National Tinsel Company	25.00
" 12	W. B. Jarvis Co.	150.00
" 12	McGraw Elec. Co.	25.00
" 12	Royal Typewriter Company	15.00
" 12	Auto City Plating Co.	25.00
" 12	Knapp Monarch Company	10.00
" 15	Apex Smelting Co.	50.00
" 21	Minneapolis-Honeywell Company	10.00
" 22	Woodward Lathrop	25.00
" 23	American Brass Company	60.00
" 23	DeVilbise Company	25.00
" 24	The Bristol Company	25.00
" 24	Underwood Elliott Fisher	10.00
" 25	Eastern Tool & Mfg. Company	10.00
" 28	Refund from Dr. Blum	24.95
July 1	J. C. Miller Company	50.00
" 3	Chrysler Corporation	150.00
Aug. 11	General Spring Bumper	50.00
" 20	Oneida, Ltd.	50.00
Sept. 1	Dividend — Union Trust	242.06
Oct. 16	Greene Mfg. Company	25.00
" 16	Refund on Check	7.00
Nov. 13	Remington Rand Inc.	25.00
Dec. 15	U. S. Spring & Bumper	15.00
1938		
Jan. 5	John Freeman	25.00
" 20	Hallensched-MacDonald	25.00
Feb. 16	Western Electric Company	50.00
" 16	Douglas Aircraft	25.00
" 25	Garden City Plating	25.00
Mar. 7	Toronto Branch	25.00
" 14	Dividend Union Trust Co. Dayton	121.03
Apr. 6	The Reynolds-Robson Supply Co.	50.00
" 22	A. T. Wagner Company	37.50
" 25	J. B. Ford Company	50.00
" 28	Parker Wolverine Company	100.00
" 28	Gerity-Adrian Mfg. Corp.	100.00
" 28	The Udylite Company	100.00
May 9	General Spring Bumper Company	50.00
" 10	Detroit Branch, A.E.S.	50.00
" 10	E. I. duPont deNemours Company	100.00
" 10	Oakite Products Company	25.00
" 13	Firestone Steel Products Co.	25.00
" 13	Chandeysson Elec. Co.	100.00
" 13	Matchless Metal Polish Co.	100.00
" 14	The Advance Plating Co.	12.50
" 14	The Seymore Mfg. Co.	50.00
" 14	Forstner Chain Corp.	25.00

"	14	Electric Products Co.	15.00
"	16	Eaton Mfg. Co.	25.00
"	16	McGean Chemical Company	100.00
"	16	Kelly Plating Co.	15.00
"	17	Apothecaries Hall	25.00
"	17	The Lobdell Emery Mfg. Company	25.00
"	18	Crown Rheostat & Supply Company	25.00
"	18	The Martin Dennis Company	25.00
"	18	American Chair & Cable Co	50.00
"	19	International Business Machines	25.00
"	19	MacDermid, Inc.	25.00
"	19	Cutler Hammer Company	25.00
"	19	United Car Fastener	10.00
"	19	General Electric X Ray Corp.	25.00
"	20	Sargent & Company	25.00
"	20	Acme Steel Company	25.00
"	21	Chase Brass & Copper Co.	25.00
"	23	Victor Casket Hardware Company	25.00
"	23	Boston Branch, A.E.S.	50.00
"	24	Springfield Branch, A.E.S.	10.00
"	25	Singer Mfg. Company	25.00
"	26	Harshaw Chemical Company	125.00
"	26	Douglas & Lamason Company	25.00
"	27	Metal Mouldings Corporation	25.00
"	27	Lea Mfg. Company	25.00
"	27	Canada Cycle & Motors Co.	25.00
"	28	John E. Freeman. American Brass Company	25.00
"	31	The Bastian Blessing Co.	10.00
Check returned, incomplete indorsement, rebanked			25.00
Total Receipts			$3840.04

MR. WAGNER SENDS A LETTER OF THANKS TO MR. PROCTOR

Mr. W. J. R. Kennedy
90 Maynard Street
Springfield, Massachusetts

Dear Mr. Kennedy:

May I, through the medium of the REVIEW, express my gratitude to Mr. Proctor for his check in payment of the Herminie Dorothea Proctor Award, and to the award committee and members of the Supreme Society for their generosity in granting it to me. I am sure the decision was a difficult one considering the high quality of many of the papers presented at the Milwaukee Convention. Also, while the award was granted to me as an active member, our readers should not fail to give due credit to Dr. M. M. Beckwith, co-author of the paper, for his fine experimental work.

Mr. Proctor in establishing this award, has made another great contribution to the welfare of the society he founded. With the honor and actual compensation thus accorded the winner, writers will naturally bend greater effort toward presenting papers of continued high quality, and it will also provide material incentive for presenting papers FIRST before the A.E.S. rather than before some other group.

I am sure that many of our members will in the future receive the same encouragement and stimulation that has been mine through having my first A.E.S. Convention paper thus honored.

Yours very truly,
R. M. WAGNER
Anderson Branch, A.E.S.

Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTRO-PLATERS' SOCIETY

BRIDGEPORT BRANCH

The Regular Monthly Meeting of the Bridgeport Branch was held in the Chamber of Commerce Rooms at the Stratfield Hotel on Friday, July 1. At eight o'clock Joe Sterling, President called the meeting to order. There were twenty members present.

The Roll Call of Officers was read and accepted. The Minutes of the last meeting were read and accepted. The Sick Committee reported that George Karl was very much improved and soon would be around.

Outing Committee: The Committee voted against having a Boat Ride, the first suggestion that was made for having an Outing this year. As in other years, the affair will be an out-door Outing, to be held this year on Sept. 10 at Eichners Grove, East Main Street, Trumbull in the rear of Beardsley Park. This will not be a stag outing, it will commence at noon with luncheon, dinner will be served at five o'clock, the price will be $2.00 per person, and again, the ladies are invited. Ray O'Connor is Chairman assisted by the following—Joe Sterling, Dinner and Refreshments; George Karl, Refreshments and Sports; Geo. Wagstaff, Prizes and Sports; William Ehrencrona, Sign and Directions; Eugene Phillips, Prizes and Publicity; Walter Meyer, Baseball between the Platers and the Salesmen; and William Flaherty, Tickets.

Communications: A Communication from Mr. R. M. Goodsell, Chairman of Membership was read and Joe Sterling was named to head the Membership Committee of the local Branch, to increase the number of members.

Ed. Charleson and Joe Sterling gave very excellent reports concerning the recent Convention.

All bills against the Branch were ordered paid.

The August Meeting will be dispensed with, and the next regular meeting will be held on Friday Sept. 9, when plans will be made for an Open Meeting and Educational Session.

The Treas. Report was read and accepted.

WILLIAM FLAHERTY, *Sec.-Treas.*

NEW YORK BRANCH

The New York Branch held two scheduled meetings during the month of June at their headquarters in the Hotel Pennsylvania, New York City.

On Friday, June 10th, the meeting was a business one with matters of the coming Convention up for discussion, and later the installation of the newly elected officers for the ensuing year took place. Mr. John E. Sterling, past Supreme President of the Society, installed the new officers on this occasion. Mr. Sterling made a splendid job of the installation and advised the incoming officers of their responsibility in keeping the Branch activities up to par in the year to come.

The second meeting on Friday, June 24th, was a business meeting taken up entirely with reports of the Convention regarding Constitutional Revision, educational and social activities, after which reports were made a social hour

STORTS "MAXIMUM VALUE"
TANKS
WITH OR WITHOUT LININGS MADE FROM
ARMCO INGOT IRON PLATE
NICKEL CLAD STEEL
STAINLESS STEEL
EVERDUR METAL
MONEL METAL
ALUMINUM
TANKS AND LININGS OF RUBBER, CHEMICAL-LEAD, ANTIMONY-LEAD, TIN-LEAD, TELLURIUM-LEAD AND STEBBIN'S CERAMIC AND CARBON BRICK
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MANUFACTURERS OF WELDED FABRICATIONS TO SPECIFICATIONS

Please mention THE MONTHLY REVIEW *when writing*

with refreshments for the membership was had.

The New York Branch will hold but one meeting per month during July, August and September. This is in accordance with the usual yearly custom. The meeting will be held on the fourth Friday of the month.

FRANKLYN J. MACSTOKER, *Sec.*

CLEVELAND BRANCH

The regular monthly meeting of the Cleveland Branch of the A.E.S. was held Sat. June 4, 1938 at Hotel Cleveland.

Our President Mr. Wm. Scott called the meeting to order at 8:15. He then turned the chair over to our new President Mr. Fred Matts and also put the new officers in office.

Mr. Rudy Freschknet of the White Sewing Machine Co. of Cleveland Ohio, applied for active membership in the Cleveland Branch.

There were no elections.

Entertainment committee reports the Cleveland Branch will have a stag picnic Sat., August 13, 1938 at Sunnybrook Gardens. Mr. Singler, Mr. O'Berg, Mr. R. Lyons are committee men for the picnic.

There will be no July meeting. The next meeting will be Aug. 6, 1938.

Meeting adjourned at 10:15.

CHARLES F. OTT, *Sec.-Treas.*

ROCHESTER BRANCH

The Rochester Branch held its regular monthly meeting at the Seneca Hotel on Friday night, June 24. Meeting called to order by President Ray DelRosso. Minutes of previous meeting read and approved as read. Bills presented and ordered paid. Communications read. No comments. The application of Mr. Ernest Fasson, 584 Smith St., Rochester, N. Y. as an associate member was acted upon and he was elected. The application of Mr. Michael Fasson, 584 Smith St., Rochester, N. Y. was read and he was elected as an active member. The report of delegates to the convention was then heard, all reports being very favorable. Under new business it was decided to hold a picnic sometime in August, the Pres. to appoint the committees later. The meeting was then turned over to a discussion on how to make the meetings more interesting and inviting to all members and some very excellent ideas were propounded on which we will act at some future date. After a little further business during which it was decided not to hold any meetings during July and August, the meeting was adjourned.

JUDSON R. ELSTER, *Sec'y.*

TOLEDO BRANCH

A regular meeting of the Toledo branch of the A.E.S. was held at the country home of Mike Spanolis, July 7, 1938, with 17 members present. The meeting was called to order at 8:30 o'clock P. M., by our President Mr. Moore. The minutes of the June meeting were then read by the sec. and approved by the membership present. The secretary then read the communications which were acted upon, and ordered filed. The chair then asked for a report from the National Convention Delegates, at which time Mr. Wieker gave a very thorough report of the Convention Proceedings. A bill was presented by Mr. Nagel, Chairman of the Convention Exhibits Committee, of $14.01 for freight to Milwaukee, and express back to Toledo, on the exhibits sent to the Convention, which was acted upon and ordered paid.

The question of an outing was discussed under new business, and it was finally decided to have a picnic at Gem Beach, Saturday Aug. 6, and dinner at 5:30 at Marsells Inn, price $1.00 per family for members and guests the regular price of the meal. A motion was made to charge .50 extra for children, which was promptly voted down. The chair then appointed the Sec. and Mr. Walter Wieker on a committee to make the final arrangements, the committee to meet at Gem Beach on Saturday July 16, for that purpose. The chair then asked for a poll of the members present, as to who were going to the dinner, all present said they were going but one, which gave all indications of a large attendance. The meeting then adjourned, and the usual refreshments served.

GASTON BERGEMAN, *Sec.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch was held on July 9, 1938 at the Atlantic hotel.

President J. W. Hanlon presiding and all other officers present.

Mr. C. Clindinin was appointed chairman of the membership committee. Mr. E. Lanz was appointed as sargent at arms.

Mr. J. W. Hanlon gave a very interesting and detailed report of the Milwaukee Convention. Mr. F. J. Hanlon gave a report on the prize awards. Mr. H. A. Gilbertson reported on the educational sessions. Mr. M. H. Longfield reported on the exhibits. Mr. C. Clindinin reported on the paper awards.

Mr. O. E. Servis reported that all arrangements for the picnic to be held on Aug. 20, were complete and invited all the members.

The meeting was turned over to the new librarian Mr. O. Weickmann, and the following questions were found in the question box.

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ELECTROPLATERS
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ANACONDA
Copper Anodes

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1. *How much chromium can be obtained from* 100 *pounds of chromic acid?*

A. 52 pounds.

2. *How is the best way to clean sheet steel kitchen utensils like frying pans and so forth for lacquering in water dip lacquer, to prevent rusting when on counters in store?*

A. Degrease, and clean in alkali cleaner with one oz. per gal. of sodium cyanide in it and follow with a cold and hot water rinse and lacquer.

3. *Is there a process to brighten the pots and pans made from tinned sheet steel after stamping?*

A. Several suggestions offered such as wiping with whitening and running through a mild cleaner.

4. *Can a brass solution be made from a rochelle salt copper solution?*

A. Dissolve zinc cyanide in sodium cyanide and add to the copper bath and adjust the free cyanide content.

M. H. LONGFIELD, *Sec.-Treas.*

MILWAUKEE BRANCH

The Milwaukee Branch monthly meeting was called to order by President Dexter Rhodes, with all officers present.

The Minutes of the previous meeting were read and approved. A communication from our 1st Vice-President Ray Goodsell, asked for the name of one of our members of the Branch who would be willing to serve as Chairman of the Membership Committee. The President appointed Mr. Jack Geissman, who we feel can and will do the job right.

Two new applications for membership are Erwin Wilburth and Thomas J. Davy. It was moved and seconded that they take their regular course.

The General Chairman of the Convention, Ray Goodsell, expressed his personal thanks to each member of the committee that served under him, stating that it was through their efforts that really made this convention a huge success.

Al Hermansen read the report of the Delegates at the National convention and they should be complimented on the splendid job they did.

Reports of the Auditing Committee were read and the financial condition of the Branch was found to be good.

It was also moved and seconded that we dispense with the August meeting.

Milwaukee is losing one of its younger members when Ed. Sheehan handed in his resignation. He is going back to school to study medicine. Good Luck, Ed!

Milwaukee Branch also wants to take this opportunity to thank all the delegates and members who attended the Convention and gave us their support. We did our best to see that all had a good time and we only hope that no one has any regret in his heart for coming to Milwaukee. To the Good Fellowship Club we say "Thanks" for the splendid entertainment that was provided both for the men and the ladies.

Meeting adjourned at 9:30 P. M.

ROBERT B. GOODSELL, *Sec.-Treas.*

TOLEDO BRANCH

A regular meeting of the Toledo Branch of the A.E.S. was held at the country home of Mike Spanolis, June 2, with 16 members, and 2 visitors present. The meeting was called to order by our President, Stanley Moore. The minutes of the previous meeting were then read by the secretary, and approved by the assembly. The chair then asked for a report from the chairman of the exhibits committee, at which time, Mr. James Nagle, Jr., chairman of the committee, read a letter of instructions, concerning exhibits to be sent to the Milwaukee Convention. A motion was made by Mr. Gerity that the delegates be allowed to go to the convention uninstructed, and to let them use their own judgement concerning the election of national officers, which was seconded, and passed by the members present. The matter of an outing of some kind was then discussed, and it was finally agreed that a committee should be appointed at the next regular meeting. The meeting was then adjourned, and the usual refreshments served.

GASTON BERGEMAN, *Sec.*

GRAND RAPIDS BRANCH

Our last regular meeting which was held in the Y.M.C.A. was called to order by President Vlug. The regular business was transacted after which our past President Homer Morton gave us a short talk voicing his appreciation for the interest shown by the members in the past year and stated he believed the coming year would be a bigger and better year for Grand Rapids Branch.

Mr. Charles O. Werft has accepted the chairmanship of the membership committee and will pick his own members.

The meeting was then turned over to our Librarian Homer Morton and the following questions were found in the box:—

Q. What is the best type of plating barrel for zinc plating?

Ans. There are, to our knowledge, two main types of plating barrels suitable for zinc plating. They are the barrel with "button type contact" and the "cable dangler type barrel". As the names imply, the "button type contact barrel" has a series of live bolt heads or "buttons" for the work to touch while the "cable dangler type barrel" has a flexible cable with live end protruding thru each end of the barrel so that it hangs down and mixes with the work; the cables of course do not rotate with the barrel. Both barrels have their advantages as to construction although they are both built of a hard rubber-like material. A zinc barrel must be sturdy and must also have heavy conductors since some of the larger barrels when fully loaded on a 12 to 15 volt line may carry as high as 1000 amps.

Q. Is there danger in cleaning die-castings before chromium plating of lifting the nickel?

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Ans. Yes, there is. A mild cleaner must be used and the work left in no longer than necessary. No caustic soda should be used in the cleaner as it is liable to attack the die-casting and undermine the nickel.

Q. What is the new color plating process?

Ans. The color plating process is controlled and licensed by United Chromium Inc. Many firms have now installed equipment for this finish. The colors are all produced in one bath. One advantage is that the colors are non-fading although they do require protection of a clear lacquer.

Q. I wish to obtain a better filter job so that my bright nickel will be entirely free of roughness.

Ans. Filtering is very important! One process, where the agitation is quite violent, requires constant filtering. In a case like this the filter pump must be of sufficient size and must do a very thorough job. It is difficult to obtain a good filter job unless a filter press is used. With the latter, a very complete job can be accomplished especially if one of the filtering materials is used and applied to the cloths properly.

Several questions about the new magnetic method of plate thickness measurement were asked but no one had as yet seen the method used although all members have literature on the new apparatus.

CHAS. S. WHALLEY, *Sec.-Treas.*

ANDERSON BRANCH

A dinner meeting of the Anderson Branch of the American Electro-Platers' Society was held Monday July 25, 1938 at the Y.M.C.A.

Our new President, L. R. Hinsch presided and all other officers were present.

Mr. R. M. Wagner, Librarian and author of the paper, "Rochelle Salts Cyanide Copper Baths," presented at the National Convention in Milwaukee, was the speaker of the evening.

He gave short descriptions of the papers presented at the Convention and reported that the attendance at the educational sessions was very good. He also said that the papers were of unusually high caliber this year.

E. L. MCKINNERY, *Sec.-Treas.*

PHILADELPHIA BRANCH

Application of Mr. R. W. Etter as Associate member reported favorable by the Board of Managers; Mr. Etter was elected.

The Lancaster Meeting Committee is as follows:—G. Gehling to procure train rates; J. L. Nelson bus rates; A. M. Robson, J. D. Dimon, to inquire of hall; W. A. Reynolds publicity; membership drive, also entertainment and refreshments. F. Fulforth to procure speaker. Banquet Committee added J. D. Dimon, Nat. Verrelle, H. LeRoy Beaver and G. F. Bieber.

The committee then started the ball rolling for the most successful and educational yearly meeting and banquet Philadelphia Branch has had.

One of the first considerations for discussion was broadly discussed and it was decided not to have any Advertisements in the Programme this year. The former friends and advertisers are to be notified of the banquet committee's action, acknowledging their hearty support and co-operation. Next meeting of the banquet committee to be held August 3rd 1938. Board of Officers will hold a meeting August 10, 1938.

ROBERT E. JACKSON JR., *Sec-Treas.*

BOSTON BRANCH

Boston branch held its first fishing trip Saturday July 30th, the boat that we were going on was so crowded that we changed to the steamer Myrtle. We had fifty members and their friends and they all had a fine time, plenty to eat and Harry Lack took care of the wet goods.

We went out about fifteen miles off Graves light for deep sea fishing. There was a prize for the biggest fish caught and Ed. DeLorme won the prize of $25.00. Some fish story!

USED BUFFS FOR SALE

64-68—1⅛" arbor—20 ply

Full Disc - Loose - or Sewed

Thousands of every size

8"—8¢ each 9"—9¢ each

10"—12¢ each

MICHIGAN BUFF CO., INC.

4054 Beaufait Ave. Detroit, Mich.

Joe Barron caught the smallest fish.

Harry Lack was the fishing instructor showing everybody how to bait lines, he did a good job but couldn't catch a fish himself.

Does Joe Barron like chowder? He had nine helpings and then tried to make Andy Garrett sick but Charlie Hardy should have been there and Barron wouldn't have had a look in.

Bill Treadwell was right on the job but like Harry Lack he doesn't know how to fish either. He didn't dare go home without a fish so he bought one in order to stand in with the janitor of the house.

Charlie Barber told me he had a day off and if he had started to fish in earnest Harry Lack wouldn't have had to buy any fish in fact he would have plenty for all the boys. How about that, Charlie?

Well everybody had a good time and hope to have more of these trips in the future. A. W. GARRETT, *Sec.*

CHICAGO BRANCH

The regular meeting of Chicago Branch was held on Aug. 13, 1938, at the Atlantic hotel.

Vice President G. Holmgren acting as President in the absence of Mr. J. W. Hanlon, all other officers present.

A motion was made and carried that refreshments should be served during the summer months to stimulate the attendance.

The meeting was then turned over to the Librarian who found the following questions in the question box.

Q. If nitric acid has been added to a nickel solution, is it economical to attempt to recover this solution? If so what is the procedure to take?

A. Neutralize the acid and electrolize at high current density.

Q. How much sulphuric acid does it take to lower the pH of a 350 gallon nickel solution from 6.4 to 5.8?

A. No definite amount can be stated as it depends on the amount of boric acid in the solution.

Q. What solution is best, Watt's solution or glauber salt solution?

Is it best to use acid copper solution or rochelle salt solution, and buff copper or not?

A. This question caused a very lengthy discussion the conclusions of which were, clean the work thoroughly, use rochelle salt copper solution and put a heavy nickel deposit on the work.

Q. How is a good imitation gold plate produced?

A. Add ammonia to a copper cyanide solution until desired color is produced.

Q. Will sodium sulphate increase the throwing power of a cold Watt's nickel solution?

A. No.

Q. On brushed brass plated castings that cannot be lacquered for several weeks, is there a dip that will retard staining?

A. A solution of 6 oz./gal. potassium dichromate, 2 oz./gal. potassium nitrate, with just enough sodium hydroxide to make solution alkaline to litmus paper is used with lead or carbon anodes at 2 to 3 volts for ½ to 1 miunte.

McKEON'S

Liquid Sulphur

"The Oxidizing Agent of Today"
oxidizes Copper and Silver.

NATROLIN B-4 "CHROME" Cleaner Cleans after nickel and before CHROME. Eliminates "dull" chrome finishes. Guaranteed, of course.

Sulphur Products Co., Greensburg, Pa.
Wilfred S. McKeon, President.

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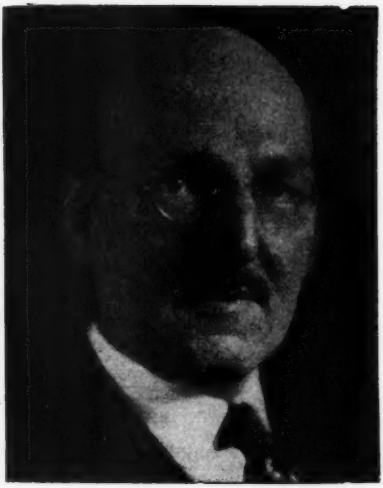

GEORGE B. HOGABOOM

Chairman of the Research Committee.

A.E.S. RESEARCH COMMITTEE AND THE JOINT COMMITTEE

A.E.S.

E. A. Anderson	New Jersey Zinc Co.	Palmerton, Penn.
R. M. Wagner	Guide Lamp Division, General Motors Corp.	Anderson, Ind.
F. Fulforth	Proctor Electric Division Proctor Schwartz Co.	Philadelphia, Pa.
	Home Address	Box 90, Roslyn, Pa.
Carl Heussner	Chrysler Corp.	Detroit, Mich.
B. H. McGar	Chase Brass & Copper Co.	Waterbury, Conn.
Bert Sage	A. S. Campbell Co.	East Boston, Mass.
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Erwin Sohn	Standard Sanitary Mfg., Co.	Louisville, Ky.

William Blum	National Bureau of Standards	Washington, D. C.
Paul M. Savage	McGean Chemical Co.	Cleveland, O.
W. J. R. Kennedy	Secretary, A.E.S.	Springfield, Mass.
George B. Hogaboom, Chairman	Hanson-Van Winkle-Munning Co.	Matawan, N. J.

Address all correspondence, 557 Stanley St., New Britain, Conn.

JOINT COMMITTEE — A.E.S., A.S.T.M., BUREAU OF STANDARDS

A.E.S. — E. A. Anderson, F. Fulforth, George B. Hogaboom, W. A. Wesley, B. H. McGar.

A.S.T.M. — J. C. Fox, J. R. Freeman, Jr., C. E. Heussner, C. H. Sample, Sam Tour.

NATIONAL BUREAU OF STANDARDS — William Blum.

Here and There

Although there are very few meetings held by the branches during July and August, the boys like to get together outdoors, as the various outings advertised in the REVIEW will show.

NEWARK outing was scheduled for Saturday, July 23. We have no report of this event, but are inclined to believe that the terrific downpour caused the outing to be postponed.

BOSTON had a deep sea fishing party on Saturday, July 30. From Andrew Garrett's letter we gather that the party was a complete success. The attendance was too much for the ship originally chartered so they had to change plans and get a larger vessel. Each year they hope to increase the attendance to the extent that the Queen Mary may eventually be chartered. Those Boston boys are "sure" ambitious. The "fish stories" regarding the trip are starting already.

DETROIT Branch members got together on Saturday, August 6, at Sandy Mac's Golf Course. Although there was a severe thunder shower in the early morning which probably kept some members away, there was a fine attendance. The golfers started the day's proceedings and there were plenty of them. Horseshoe pitching engaged others until lunch was served. After the meal was over, a baseball game was played. Carl Heussner being the umpire, everything was as it should be. Kiddie car races, an egg throwing contest, three legged race and other events were also on the program and took up the greater part of the afternoon.

The whole affair was all that one would expect from Detroit Branch. Their outings and annual banquets are outstanding events each year, the secret of their success being the wonderful spirit of cooperation shown by the members. Every place we visited during our stay in Detroit the same question was asked,

"You're staying for the picnic aren't you"? With the Detroit members showing such an interest in their Branch no wonder they lead the parade.

It looked like the Milwaukee convention for awhile with President Phillips, Past President Wilson, 1st Vice President Goodsell from Racine, and the Executive Secretary being present. Several matters were unofficially discussed while the dinner was being digested.

"Mose" Cherry, the Hanson-Van Winkle Munning Company representative in Detroit area was Chairman of the event and did a fine job. Ted Eichstaedt as usual had charge of the tickets and saw that everybody paid and received a miniature American flag as a token thereof. The athletic events were handled by J. Heofer and were run in fine style. The prizes were lovely, donated by different manufacturing concerns and supply houses in and around Detroit.

George Walter of Detroit-Rex took us through their plant on Hillview Ave. With the new additoin, they have a great place for turning out quantities of degreasing machines. They're a swell bunch of fellows. It's always a treat to meet them, away from home or in Detroit. Messers Walter, Willard and Norgren represented Detroit-Rex at the outing.

Detroit Branch is planning another of those famous banquets in the winter, so get ready. This is one of the outstanding events of the year.

Ray Goodsell, chairman of this year's membership committee of the Supreme Society, is more than pleased with the response from the Branches, regarding new members. If Ray does as good a job as he did in handling the Milwaukee Convention, we have nothing to fear.

Jimmy Higgins, President of Detroit Branch was there in person with a glad hand and a pleasant smile for everybody. Jimmie steps into A. B. Wilson's shoes this year. Can you fill them Jimmy? We think you can.

SAN FRANCISCO. Look out for some interesting news from San Francisco Branch in the September REVIEW. Mr. J. G. McCallum, the President, has something interesting to tell.

CHICAGO Branch holds its annual Picnic on Saturday, August 20. This is another event that is always worth while. As we cannot be there, we hope the Secretary Mr. Longfield, will give us all details.

BRIDGEPORT outing will be held Saturday, September 10. A good program has been arranged. Ray O'Connor is chairman, assisted by George Karl, Eugene Phillips, George Wagstaff, John English, Joe Sterling, Walter Meyer, and Wm. Ehrencrone.

ASBURY PARK, N. J. Start saving now to give your family and yourself the best vacation you ever had. Attend the A.E.S. Convention at Asbury Park, June, 19-22, 1939.

PRESIDENT WILSON'S REPORT TO THE CONVENTION AT MILWAUKEE

It would be a great pleasure to be able to tell you men of great accomplishments during the year just ended. Unfortunately, that is impossible. Instead you will hear of a gradual, steady growth of the many activities of the Society. Most of the work and aims of your present administration are being brought to a head at this meeting and your decision will tell whether or not we have accomplished much.

Before going further, we would like to bring to your attention the fact that early in the fiscal year just ended inquiry was made of all the Past Presidents plus a number of prominent members as to any criticisms or suggestions that they might have. A few replied. Most did not. We, therefore feel that our membership having been given this opportunity are satisfied with the way in which things have been conducted.

In the matters which will be covered at length by your other officers I will be brief. However, as we go along I am going to comment on things and try to give you a *picture of conditions* as I see them. During the past year through the appearances of your Executive Secretary at many branches and through the appearance of myself at a few, as well as by editorials in the REVIEW, we have made a sincere effort to keep our members informed as to conditions relative to the Society. We have felt that it was much to our advantage for the Society to know just what conditions were and that we could expect better cooperation from members more familiar with the problems confronting your officers. This policy will be continued throughout this meeting.

In the matter of increasing our *membership*, we have made only fair progress. A large share of our increase in membership comes from our two youngest branches, — Buffalo chartered this year, and New Haven chartered last year. The older branches do not seem to have done so well. This lack of gain on their part is primarily, we think, due to not enough effort although it may possibly be due to the fact, as reported by one branch, that there are no more prospects in their vicinity eligible to membership in this Society. It would seem that it is time to give this matter serious consideration.

Our *educational work* and programs throughout the year have been of the highest type. Our speakers at both branch and our more or less sectional meetings have been of the best. Supplementing these, the papers and abstracts in the REVIEW have been well worth while. Our educational work this year, as in the past, has drawn much favorable attention.

At our last meeting, the office of *Third Vice President* was created to provide an Executive Board of an odd number of men. So naturally a Third Vice President was elected and after we got him, we didn't know just what to do with him. By that I mean there was no specific duty for him to perform. However, in the years past, there has always been great difficulty in getting exhibits of plated work from our members. So in accordance with the suggestion of our Retiring President, the new Third Vice President was appointed chairman of our *Exhibits Committee* and was given the job of drumming up interest in and exhibits for this convention. This job was well done. Our exhibit of work plated by our members and branches is not only bigger but it is also better than ever.

In looking over the papers to be presented, note the *well-balanced program*. You men have all in past years heard comments to the effects that the papers were too technical, were "over the heads" of the platers, etc. I have heard some papers that I will admit were pretty tough on me. However, it has been extremely hard to get papers from the practical man, the plater himself. It seems the answer to at least some of these problems has at last appeared. It is the branch paper. This seems to meet a long felt need. It gets the practical men and the technical men in the branches to collaborate, to talk things over freely, to get closer together and this is just what we need. On the other hand we, too, have *highly technical men* in our organization. They are assets to any society and we need them. To hold their interest we also must provide papers such as they prefer. In this connection, I would like to call your attention to the splendid series of papers on electrodepcsition presented at the Spring meeting of the Electrochemical Society. Some of us are members of both societies but some belong to only one, selecting the one which best meets their particular needs. My point in bringing this up is to impress upon you the fact that we must have papers of interest to all interested in electroplating, so that our Society will grow and we will live happily ever after.

One of the main activities of your Society is the *research work*. This work has been going on for some years and its results have been of great value.

Shortly after taking office, I began to hear *complaints* of the manner in which the Research work was conducted. A thorough investigation of this was made and the matter finally resolved itself down to the fact that the complaints were not so much against the way the work was being handled as they were against the fact that the members of the Society did not know what was going on. Here was a matter in which they were deeply interested but of which they knew very little. At a meeting in

Washington last October this was laid before the Research Committee. It seemed that the dearth of information was due so far as the committee was concerned to two things; first, the committee felt it had little of interest to report until the tests were completed; and secondly, inasmuch as the work is done at the Bureau of Standards, under government control, it is not always possible to release advance information as desired. The committee after talking things over unanimously decided that insofar as possible the members should be kept informed through the Research page in the REVIEW. We hope that you have found it of interest.

As to our present research work you will hear in detail of it this afternoon. Suffice it here to say that it is proceeding satisfactorily.

Despite our somewhat pessimistic view of the *research finances* as expressed in the May REVIEW due to the hard work put in by your Research Committee during the past six weeks, these finances are again in good shape. The details will be given you later by the Secretary of the Research Committee. In connection with this I am going to mention a subject which the Research Chairman may care to enlarge upon later and which was put forth by one of your presidents several years ago. It is the idea that for financing the research work there should be some well organized plan by which a *steady income* could be assured for this work rather than the haphazard method of contributions now in vogue.

Before dropping the matter of research, I would like to remind you that despite all of the ideas you must have relative to future research work *no suggestions* have as yet been received from other than members of the Research Committee.

I am now coming to a subject which I have been emphasizing throughout the year whenever the opportunity offered. I mean the *advertising in the Review* which is so vitally important in the life of this Society.

Advertising is business. Running this Society is business and this is a business meeting, so I am taking this opportunity to acquaint all of you delegates with the facts regarding our advertising during the past year. To this end each of you have been given a sheet showing the essential figures. As this was compiled by myself during the past week, there may be some very *minor errors* in the pages as shown. Also, the figures for May Advertising Sales and Cost of Printing were not available. If you want to fill them in, they are Sales $568.00; Cost $478.00.

Before going further I would like to make it plain that the publication of this sheet *is not for the purpose of showing* who did or did not advertise with us. It is solely for the purpose of making it clear to our members just how important advertising is to us.

You can note readily that our *advertising is decreasing* as shown by the total pages at the bottom of each column. You can note that certain firms have felt obliged to curtail advertising. It may seem that our receipts have not dropped off appreciably as yet but if you note the down trend in the number of pages, the receipts must surely follow.

I do not want to burden you with details, so let's just *approximate a bit.* Roughly speaking, the cost of publishing each page is five dollars. The year end will show about $2,500.00 profit from the REVIEW, but that is not all. The total number of pages published was 1004, of which 285 were advertising. The balance of 719 pages were reading matter. Without advertising, each of these 719 pages would have cost us five dollars. With advertising they cost us nothing. It is entirely proper that the resulting saving of $3,595.00 be added to our actual net. It is certainly obvious that advertising in the REVIEW has netted us during the past year not less than six thousand dollars.

It is readily apparent that any *marked decrease in our advertising volume will be at once reflected in our financial condition.* Companies cannot afford to advertise in a medium which does not produce results and you cannot expect them to do so. Therefore, it is up to you men to support the REVIEW by helping us to get advertising and seeing that the advertising produces results. I could go along like this for some time, but I think you have heard enough from me.

In closing, I would like to thank the officers and members who have helped me throughout the year. I would also like to thank you for the privilege of serving as President during the past year.

NEW HAVEN BRANCH

The New Haven Branch of the A.E.S. held a business meeting Wednesday, August 10, at the New Haven Y.M.C.A. The purpose of this meeting was to get a program under way for the coming season. It has been planned to have the monthly educational session the first Tuesday of every month. These sessions proved to be very popular last year and their continuance was requested by many members. In addition to these sessions Tom Chamberlain, Chairman of the educational committee, has outlined plans for a lecture course open to anyone interested. This course, a sequel to the course in the analysis of plating solutions held last year, will cover the fundamental principles of electro-chemistry, and will be held bi-monthly (2nd and 3rd Tuesdays every month.)

The sum of $200 was set aside for the educational committee to carry on the work for the coming year. Henry Smith was elected to the Board of Governors to replace William Bridgett who recently resigned.

President Joe Downes appointed Henry Creamer, Chairman of the Membership Committee, with the understanding that he appoint his own committee.

Membership Report

To August 1, 1938

ELECTIONS

Ernest Fasson, 584 Smith St., Rochester, N. Y. — Rochester Branch
Michael Fasson, 584 Smith St., Rochester, N. Y. — Rochester Branch
Robert W. Eter, 606 Lafayette St., Lancaster, Penn. — Associate, Philadelphia Branch
Kasmir J. Jaros, 164 Greenwood Ave., Waterbury, Conn. — Associate, New Haven Branch
Oscar A. Stocker, c/o Seymour Mfg. Co., Seymour, Conn. — Associate, New Haven Branch
B. J. Slivka, National Paint Co., Chicago, Ill. — Associate, Chicago Branch
C. O. Meline, The Harshaw Chemical Co., Chicago, Ill. — Associate, Chicago Branch
A. T. Leonard, Superior Plating and Rush Proofing Co., Chicago, Ill. — Active, Chicago Branch
B. Wagner, Belke Mfg. Co., Chicago, Ill. — Associate, Chicago Branch

APPLICATIONS

J. E. Morgan, c/o Hoosier Lamp & Stamping Co., Evansville, Ind. — Chicago Branch
Erwin Wilburth, 3522 N. 23 St., Milwaukee, Wis. — Active, Milwaukee Branch
Thomas J. Davy, 4740 N. Drake Ave., Chicago, Ill. — Milwaukee Branch
R. Freschknet, White Sewing Machine Co., Cleveland, O. — Active, Cleveland Branch
Louis L. Valone, 217 Spring St., Apt. 6., Jamestown, N. Y. — Associate, Buffalo Branch
Robert R. Bair, 614 Chilton Ave., Niagara Falls, N. Y. — Associate, Buffalo Branch
Charles W. Logan, 48 Nassau Blvd., Kenmore, N. Y. — Active, Buffalo Branch

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Harry Lloyd Benner, R. & H. Chemicals Dept., E. I. duPont, Niagara Falls, N. Y. Associate, Buffalo Branch
Laurence F. George, 14872 Alger Road., Cleveland, Ohio Associate, Buffalo Branch
Chas. J. Menzemer, 93 Stone St., Buffalo, N. Y. Associate, Buffalo Branch
Frank Nowakowski, 131 Casimer St., Buffalo, N. Y. Associate, Buffalo Branch
Robert McKeown, 195 Christiana St., North Tonawanda, N. Y. Associate, Buffalo Branch
Charles E. McCullough, 71 Prospect Ave., Buffalo, N. Y. Associate, Buffalo Branch
Harold Wood, 225 Rodney St., Buffalo, N. Y. Active, Buffalo Branch
Anthony Rickman, Box 287, Jamestown, N. Y. Active, Buffalo Branch
Newton S. Marlette, 223 Minnesota Ave., Buffalo, N. Y. Active, Buffalo Branch
Alois Lamprecht, 23 Timon St., Buffalo, N. Y. Active, Buffalo Branch
Raymond F. O'Grady, 1095 Niagara St., Buffalo, N. Y. Active, Buffalo Branch
Ernest T. Fest, 671 Delaware Road., Kenmore, N. Y. Associate, Buffalo Branch
Arthur Peter Pfeil, 85 Leroy Ave., Buffalo, N. Y. Associate, Buffalo Branch
D. Ward Hill, 163 Shepard Ave., Kenmore, N. Y. Associate, Buffalo Branch
Leon A. Nowak, 98 Broadway, Buffalo, N. Y. Active, Buffalo Branch
Otto Bert Kirchoff, Jamestown Electro Plating Co., Jamestown, N. Y. Active, Buffalo Branch
Seibert M. Johnson, Jamestown Electro Plating Co., Jamestown, N. Y. Active, Buffalo Branch

RESIGNATIONS

Anthony Knechtel, 1255 Jefferson Ave., Brooklyn, N. Y. Active, New York Branch
Edward F. Lawrence, 179 Eckford St., Brooklyn, N. Y. Active, New York Branch
George Colombie, 295 Hillside St. Torrington, Conn. Waterbury Branch

REINSTATEMENTS

Anthony Partinski, 7534 Appoline, Dearborn, Mich. Active, Detroit Branch

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The Abstract Section

FREDERICK FULFORTH, *Chairman, Program and Educational Committee*

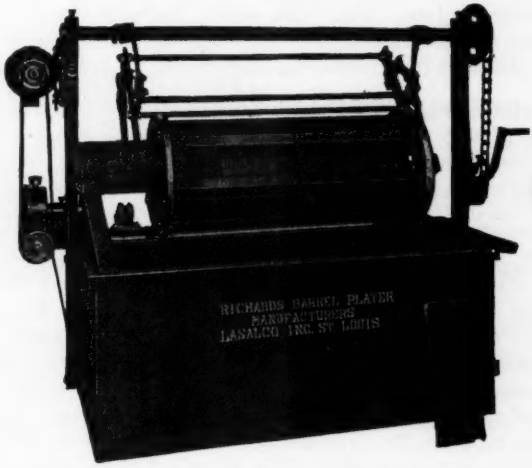
Process in Zinc Coating and Electro-Galvanizing of Sheet and Wire. By WILLIS M. PIERCE. *Metal Progress*, July 1938, Page 53— Because nearly half the zinc produced in the United States is used for galvanizing the prosperity of the industry is dependent, to a great extent, upon the production and consumption of galvanized sheet and wire. The demand for increasingly heavy, and more adherent deposits has led to important developments in electro-galvanizing. The outstanding advantage of electro-galvanizing as compared with hot dip galvanizing is the combination of excellent adhesion and very heavy coatings obtainable. Adherence of hot-dipped coatings is improved by use of pure zinc and by reducing the iron-zinc alloy which forms next to the steel. The smoother the steel the better the coverage that can be obtained. Adherence is influenced by the inner iron-zinc layer and by the ductility of the outer zinc layer. The iron-zinc alloy layer may be reduced to a comparatively thin film by the use of 25% zinc chloride rather than the usual hydrochloric acid flux. It will decrease the immersion time considerably because it eliminates the necessity of converting the iron chloride back to metallic iron. It also reduces the quantity of dross formed. Fluxes based on zinc-ammonium chloride perform satisfactorily only when traces of lead and cadmium are present in both the zinc and the flux. D. S. HARTSHORN, JR.

Metallic Coatings. *Steel*, **102** No. **25**, June 20, 1938, pp. 60-65—A type of metallic coating obtained by placing, for instance, a steel object in a container containing aluminum chloride gas at 750-1100 deg. C. The iron replaces the aluminum, the latter being deposited on the surface of the object. Coating obtained is uniform, non-porous, and integrated with the base metal.
C. B. F. YOUNG.

"Plating Zinc Alloy Die Castings Commercially." By E. A. ANDERSON, New Jersey Zinc Company, Palmerton, Pennsylvania. *Metal Cleaning and Finishing*, July Issue. This is the first of a series of articles by Mr. Anderson which will cover the commercial practice of finishing zinc alloy die-castings. This article is the finest and most comprehensive one which has been published in recent years. The article is a compilation of the procedures used in cleaning and plating of zinc alloy die-castings in twenty-three different concerns in the United States.

The first article covers the polishing, buffing, and coloring from the practical standpoint also cleaning, rinsing, and acid dipping prior to plating. It is very evident from this article that the procedures vary widely and there is a very definite need for some type of standardization. It would be very interesting if there were also data on the percent of rejects with each of the twenty-three methods of finishing over a long period of time. ROBERT R. SIZELOVE

Made in Four Sizes



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Barrel Finishing of Metal Products. By H. LeROY BEAVER pp. 20-31 *Products Finishing*, June, 1938. The author discusses the development of various shapes such as the ball cone, diagonal, and peb for use in burnishing. Examples of the use of the various shapes are given. P. RITZENTHALER.

Manual of Electroplating Solution Analysis and Control. By E. A. BLOUNT, pp. 36-45, *Products Finishing*, June, 1938. The article discusses chemical and mechanical methods of analyzing solutions for purposes of control. Detailed methods for the analysis of alkaline cleaning solutions, pickling acids, copper cyanide, and acid copper solutions are presented.
P. RITZENTHALER

METALS AND ALLOYS ABSTRACTS

Aluminum Plating from Organic Baths. By R. D. BLUE & F. C. MATHERS. *Trans. Electrochemical Soc.* Vol. **9**, 1936 pp. 519-527. Original research. An improved bath for electrodepositing A1 is described in detail. The bath is superior to any hitherto suggested in that it is easier to prepare, is less expense and operates with higher electrode efficiencies. The bath contains 20 g. A1 bromide, 20g. A1 chloride and 4g. A1 in 40 cc. ethyl bromide, 80 c.c. benzine and 40 c.c. xylene. The average cathode efficiency is about 75% and the anode efficiency 100%. H Br and H Cl may be substituted for ethyl bromide under certain conditions. Current density was 1.55 amp/dm_2 — temperature 20°C. A1 anodes and Cu cathodes were used. The authors believe the bath has commercial possibilities. P. RITZENTHALER

Nickel-Cobalt Alloy Plating from Acid Sulphate Solution. By C. B. F. YOUNG & N. A. GOULD. *Trans. Electrochem. Soc.* Vol. **69**, 1936, pp. 585-597. *Original research.* The co-deposition of Ni & Co from an acid sulphate solution was investigated. Increase of temperature of the bath resulted in an increase of Co content of the alloy produced and a decrease of current density decreased the Co content. Increasing the speed of rotation of the cathode decreased the Ni content and a change of pH toward higher acidity resulted in increased Ni content. Gelatin added to the solution produced bright deposits at a fairly high current density without noticeable effect on the composition of the alloy. P. RITZENTHALER

Nickel-Cobalt Plating from Low pH Acid Sulphate Solutions. By C. B. F. YOUNG & C. EGERMAN. *Ibid* Vol. **72,** 1937, pp. 447-460. Investigation of the deposition of Ni-Co alloy with a rotating cathode. Effects of various conditions are discussed. The Co content was increased by increased agitation, current density, temperature and acidity. Addition of brightener did not offset the composition of the deposits. P. RITZENTHALER

Testing the Modern Finish. By RAY C. MARTIN. *Products Finishing*, July, 1938. This article contains a brief description of methods for determination of Tensile Strength, Salt Spray, and Colorimeter-Cryptometer values for lacquers and other modern metal finishes. The Pfund Multiple Reflection Colorimeter is described in some detail. By means of this instrument minute variations of color may be detected, and the 'hiding power' of finishes accurately compared. E. LACY

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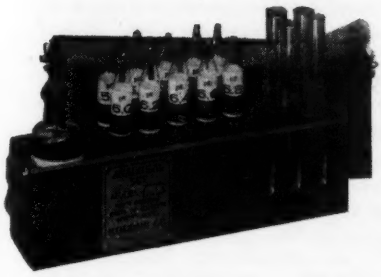

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Barrel Finishing of Metal Products. By H. LeROY BEAVER. *Products Finishing*, July, 1938. This is part two of a series of articles on the above subject. It deals with factors in the barrel finishing and maintenance of Silver plated wares. Methods of operation and materials used are given. E. LACY

Barrel Finishing of Metal Products. By H. LEROY BEAVER. "*Product Finishing*", July 1938, pp. 16-22. Article discusses further the cleaning and burnishing of silver plated ware. Sulphur tarnish is chief offender on silverware. Cyanide not recommended for removal due to danger of poisoning. Two methods for removal are (1) 4 oz. table salt and 4 oz. baking soda per gal. water. Put several pieces of sheet zinc on bottom of pail. Pile silverware on top. Cell action will remove tarnish, (2) Similar method using aluminum pan and 4 oz. Trisodium Phosphate.

Scratches are smoothed down by barrel burnishing. Author again emphasizes that no silver is removed during this operation, as tarnished silver cannot be cleaned by burnishing alone. An excellent hand silver cleaner is sodium bicarbonate powder used on a damp rag.

Barrel for burnishing flatware recommended is 8" in diameter and 24" long. Should contain about 125# of steel burnishing material. Run with soap for 20 minutes and rinsed in hot water. A ball and pin mixture is good for silver maintenance. Soap suggested is a hard tallow base, curd type semi-solid soap. A sodium soap should be used for white color.

P. J. RITZENTHALER

METALS AND ALLOYS

Stripping of Chromium Deposits for Thickness Measurements. By S. G. CLARKE. "*Metal Industry*" London. Vol. **52,** April 8, 1938, pp. 391-393. Acid measurements for determining the thickness of very thin (.00002") chrome deposits, based on measurements of time required for solution, as shown by the period of gas evolution. A rapid approximate estimate of clean polished Cr coatings on nickel, steel and Cu may be obtained from period of gas evolution when coating is dissolved in cold H Cl containing 20g/2 Sb_2O_3 to speed up attack. A deposit .00001" thick takes 10 seconds at 20°C. If a black film with little or no gassing appears, it indicates very thin chrome. Bare areas should be stopped off. Loss of weight tests using 5% hot sulphuric acid gave good results. P. J. RITZENTHALER

Tests and Conditions of Nickel Plating for Decoration. By MARCEL BALLAY. "*Metaux et Corrosion*" (French) Vol. **13,** Jan. 1938, pp. 4-19. Nickel coatings in thickness less than 0.3 mm. can be examined microscopically by plating with Cu on top of nickel. Magnetic and electromagnetic methods for measurements of coatings are also used. A chemical method for nickel is solution of 150 g. ferric chloride, 100 g. copper sulphate, 250 g. acetic acid cryst, and water, 1 liter for brass.

For furniture pieces, the following solution was used: 80 cc HNO_z, 20 cc H_2SO_4 and 40 cc water, at 18.5°C. Speed of solution was 0.00165 mm/min.

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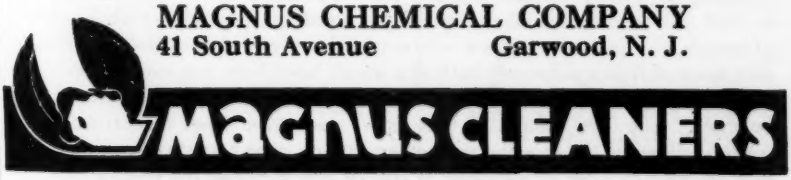

Brittle nickel contains cracks which cause corrosion. Pits are due to Hydrogen roughness due to inclusions. Salt spray reveals porosity. Ferroxyl paper also shows this. Paper made up by dipping in solution of 10 g/L NaCl and 1 g/L potassium ferricyanide. Porosity of Ni on copper tested by solution of 100 g. trichloracetic acid, 400 cc. ammonia, 700 cc H_2O.

PHIL J. RITZENTHALER

A Simple Method of Plating Nickle on Stainless Steel. By DONALD WOOD. *Metal Industry*, Vol. **36,** Pages 330-331, July 1938. The process involves a cathodic treatment (Nickle Strike) in a solution composed of Nickle Chloride 32 oz./gal. and Hydrochloric Acid 22 Be. 16 fl. oz./gal., operated at room temperature, from a 6 Volt line, drawing 50-75 amp./sq./ft., using electrolytic nickle sheets as anodes. A treatment of 2 minutes is necessary for stainless steel, while equal adhesion is obtained on brass, copper and nickle silver in about 30 seconds. In the writers opinion the (Nickle Strike) is preferable over the commonly used (Copper Flash) as a preparatory deposit, for the nickle strike offers greater adhesion, it reduces oxides and prevents the formation of carbon smuts. Smooth and bright deposits (depending on the finish of the basis metal) can be obtained up to .0001". PAUL A. OLDAM

Lacquering Methods. By E. M. STEPHENSON. *Metal Industry.* Vol. **36**, Page 380, August 1938. Many very interesting pointers are given that the practical layman can include in his book of lacquering wrinkles. Maintenance to spray booths, turntables, drying ovens and to spray guns are given. Also many novel finishes are described e.g. crackle finish, crystalized effects, two tone, and bleeding through effects that produce imitation marble, agate or onyx coatings. PAUL A. OLDAM

Plating to Specifications. By NATHANIEL HALL. *Metal Industry*, Vol. **36,** Pages 339, 340, 341 July 1938. Quality plating and plating to specifications are explained in terms that are understandable to the average jobber and manufacturer, for a purpose to elevate a higher standard in the plating industry. Also many methods of determining the thickness of deposits are mentioned, e.g. determining the weight of articles before and after plating; stripping deposits and determining them by chemical analysis; microscopic measurements; Mesle Cord method; magnetic tester for thickness of deposits; drop and jet test methods, and many others. PAUL A. OLDAM

Anode and Cathode Weight Losses in Galvanic Corrosion. By W. A. WESLEY. *The Metal Industry*, London, England. Volume **L3,** No. 2., July 8, 1938. The author describes the result of corrosion tests made with a variety of metals and solutions. Simple relationships between current flow and corrosion rates of iron anodes and cathodes which have been suggested at various times, have been found to be more widely applicable than was here-to-fore believed. The data offered in this report was taken from laboratory tests made at different times in the past several years. The term "Galvanic Corrosion" is used to refer to corrosion of metals which causes the flow of current between discrete anodic and cathodic areas. Also the behavior of dissimilars

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metals in contact, concentration cell actions, differential aerations cells, and the like fall under the same heading. They are distinguished from corrosion produced by stray currents or other electrolysis by the fact that energy comes from the cell itself rather than from an external source. In true galvanic corrosion, the source of the current is usually the corrosion of the anode; instances of anode corrosions which are lower than the amount equivalent to the galvanic current are rare, instead the anode corrosion is usually greater. The set-up employed for the tests, various tables showing anode and cathode losses, and discussion of data on anode corrosion, are all clearly shown and illustrated.

ROBERT B. GOODSELL

A Method for the Formation of Electrodeposits upon Aluminum Alloys Particularly Those Containing Magnesium and Zinc. *Verfahren zur Herstellung von galvanischen Überzügen auf Aluminiumlegierungen, insbesondere solchen, die Magnesium und Zink enthalten.* German Patent 660, 657. The following method is claimed to properly treat aluminum castings previous to plating to give adherent deposits. The aluminum-magnesium die castings are first etched in a warm (140°F) 10% caustic soda solution and the gray etched castings are then washed and immersed one minute in a 1:1 nitric acid solution. The castings are next oxidized for four minutes in a 6% oxalic acid solution (70°-80°F) using a constant bath voltage of 35 volts. After the oxidation the castings are rinsed vigorously in water and then etched from 72 - 80 seconds in a warm (175°F) sodium bicarbonate-sodium carbonate solution. This etching process removes most of the oxide leaving a porous structure for good anchorage of the electrodeposit. After the etching, the objects are washed and then dipped for 20 seconds in 1:1 nitric acid. The castings are rinsed and transferred to the plating bath with the current on when the parts are immersed.

NOTE. This abstractor has tried out a similar process of the Krome-Alume Co., Lockport, N. Y., and found it to be very successful.

WALTER R. MEYER

The Electrodeposition of Bronze Using Bi-Metallic Anodes. By C. BECHARD-Compt. rend., 1933, **196,** 1480. The article is an investigation into means of keeping the composition of an electrolyte, for alloy deposition, constant by controlling anodic dissolution. Investigators used a mixture of copper and tin in an oxalate bath. High current was needed to prevent a displacement of the copper by the tin; reported that current densities varied from 5 to 10 amps. per sq. dcm. In alkaline cyanide-stannate baths there was no copper displacement but a very high current density at the anodes was necessary to produce satisfactory dissolution of the tin. Workers report better adjustment of the solution by using some insoluble carbon anodes in conjunction with the soluble alloy anodes. Conclusion is that there are more difficulties to be encountered with the deposition of this alloy than with the deposition of brass.

The article can be read in Bulletin #28 Series A Tech. Pub. of the Internat. Tin Council, N. Y.

R. SCOTT MODJESKA

The BUYERS' GUIDE—Continued

Equipment—Continued

Crown Rheostat and Supply Co., 1910 Maypole Ave., Chicago, Ill.
Hanson-Van Winkle-Munning Co.
Chas. F. L'Hommedieu & Sons Co.,
Frederic B. Stevens Inc., Detroit, Mich.
U. S. Gal. & Plating Equipment Corp., 30 Heyward St., Brooklyn, N.Y.
The Meaker Co., 1629 S. 55th Ave., Chicago, Ill.
F. Gumm Chem. Co., Inc., Kearny, N. J.
Divine Bros. Co., Utica, N. Y.
Lasalco Inc., St. Louis, Mo.
American Instrument Co., 8010 Georgia Ave., Silver Spring, Md.

Glue

J. J. Siefen, 1936 W. Lafayette Boulevard, Detroit, Mich.

Lead Lined Tanks

StortsWelding Co., Inc., Mefiden, Conn.
Hanson-Van Winkle-Munning Co.

Meaker Process Galvanizing

The Meaker Co., Chicago, Ill.

Metal Lacquers and Finishes

Alrose Chemical Co., 80 Clifford St., Providence, N. Y.
Egyptian Lacquer Mfg. Co., N.Y.C.
Maas & Waldstein Co., 432 Riverside Ave., Newark, N. J.
Zapon Company, Stamford, Conn.
J. J. Siefen, Detroit, Mich.

Metal Working Lubricants

Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York City

Oxidizing Agent

Sulphur Products Co., Greensburg, Pa.

pH Papers

Paul Frank, 456 Fourth Ave., New York City.
The Harshaw Chem. Co., Cleveland, O.

Plating Barrels

E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.
U. S. Gal. & Plt'g Equip. Co., Brooklyn, N. Y.
Belke Mfg. Co., Chicago, Ill.
Lasalco Inc., St. Louis, Mo.

Plating Tanks

E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.
Belke Mfg. Co., Chicago, Ill.
U. S. Galvanizing and Plating Equipment Co., Brooklyn, N. Y.
Storts Welding Co., Inc., Meriden, Conn.

Polishing Lathes

E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.
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Hanson-Van Winkle-Munning Co.
Chas. F. L'Hommedieu & Sons Co., 4521 Ogden Ave., Chicago, Ill.
F. Gumm Chem. Co., Inc., Kearny, N. J.
Divine Bros. Co., Utica, N. Y.
Lasalco Inc., St. Louis, Mo.
Belke Mfg. Co., Chicago, Ill.
J. J. Siefen, Detroit, Mich.

Polishing Wheel Cement

The Udylite Co., Detroit, Mich
Harrison & Company, Haverhill, Mass.

Polishing Wheels and Materials

Hanson-Van Winkle-Munning Co.
Chas. F. L'Hommedieu & Sons Co.,
Matchless Metal Polish Co., Glen Ridge, N. J. and Chicago, Ill.
The Udylite Co., Detroit, Mich.
F. Gumm Chem. Co., Inc., Kearny, N.J.
Bruce Products Corp., Detroit, Mich.
E. Reed Burns, Brooklyn, N. Y.
Divine Bros. Co., Utica, N. Y.

Rouges

Harrison & Co., Haverhill, Mass.
Hanson-Van Winkle-Munning Co.

Rubber Lined Tanks

StortsWelding Co., Inc., Meriden, Conn.

Soaps

Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York City

Solution Control Methods

E. I. Du Pont de Nemours & Co., Inc.,
Hanson-Van Winkle-Munning Co.,

Solvents - Degreasing

Detroit Rex Products Co., Detroit

Stripping Compounds

E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.
F. Gumm Chem. Co., Inc., Kearny, N. J.
Oakite Products, Inc., New York City

Testing Instruments

E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.
Kocour Co., 4720 S. Christiana Ave., Chicago, Ill.
The Harshaw Chem. Co., Cleveland, O.

Tumbling Barrels

StortsWelding Co., Inc., Meriden, Conn.

Udylite Cadmium Service

MacDermid Inc., Waterbury, Conn.

pH PAPERS FOR TESTING BRIGHT NICKEL SOLUTIONS

In view of the wide-spread interest in bright nickel plating a good many readers would welcome the information that bright nickel solutions can be tested with pH Papers and a new number (BN 1.6-3.7 pH) has been brought out by Paul Frank of New York City which covers the pH range for bright nickel effectively.

NEWS RELEASE TO TRADE PRESS

Magnus Chemical Company, Inc., Garwood, N. J., announces three appointments to its sales department.

Raymond D. Kennedy becomes a resident sales representative in Philadelphia, Pa.

William F. Newton will represent Magnus in California.

Douglas L. Foster will represent Magnus in western New York State.

Magnus Chemical Company is the manufacturer of cleaning materials, industrial soaps, metallic soaps, sulfonated oils, emulsifying agents and metal working lubricants.

THE PLATE TYPE COPPER OXIDE RECTIFIER

The last word in a source of low voltage, high amperage, direct current. By Clarence E. Berger, Electrical Engineer, Hanson-Van Winkle-Munning Co., Matawan, N. J.

During the last half century, the low voltage motor generator set as made in the United States has been brought to a very high state of perfection, and for some applications it is still the best type of equipment to use. However, it does present all the problems inherent in machinery with rotating parts; the proper installation, oiling, ventilation and bearing maintenance, in addition to the constant need for commutator and brush maintenance and replacement.

The commercial background of the copper oxide rectifier is only about ten years old. During this decade many thousands have been built for battery charging and other purposes, in the form of discs with low wattage output. For high wattage, the plate type has been developed and this form of rectifier has already had some years of experience behind it, both in the United States and in Europe.

The copper oxide rectifier belongs in the same class as the galena crystal: what is known as Composite Conduction Rectifiers and sometimes referred to as Junction or Contact Rectifiers. The copper oxide rectifier is ideally suited for the production of large volumes of current at low voltages.

In performance, the rectifier has much to recommend it. In sizes up to 3000 amperes it has a higher efficiency than the motor-generator set and a power factor of approximately 95%. The voltage regulation is approximately 20% which compares favorably with the shunt wound generator. There is no expense for maintenance of brushes, bearings, commutators, etc.

Manufacturers who need a new or additional source of current for electrochemical work, should seriously consider the plate type copper oxide rectifier. It is no longer an experimental device but a sound, commercially practical and proven type of electrical equipment.